

(FILE 'HOME' ENTERED AT 14:13:31 ON 31 MAY 2003)

FILE 'CAPLUS, WPIDS, COMPENDEX' ENTERED AT 14:13:58 ON 31 MAY 2003

L1 37232 FILE CAPLUS  
L2 17098 FILE WPIDS  
L3 7915 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L4 62245 S (FUEL CELL?)  
L5 49672 FILE CAPLUS  
L6 18949 FILE WPIDS  
L7 7478 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L8 76099 S (NAFION? OR IONOMER? OR ((ION EXCHANGE?) (10A) (POLYMER OR RE  
L9 1915 FILE CAPLUS  
L10 448 FILE WPIDS  
L11 344 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L12 2707 S L4 AND L8  
L13 7 FILE CAPLUS  
L14 1 FILE WPIDS  
L15 0 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L16 8 S L12 AND ((HYDROPHOBIC? OR APOLAR? OR NONPOLAR? OR (NON-POLAR?  
L17 86 FILE CAPLUS  
L18 35 FILE WPIDS  
L19 17 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L20 138 S L12 AND (INK? OR SCREEN? OR PRINT?)  
L21 308 FILE CAPLUS  
L22 88 FILE WPIDS  
L23 69 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L24 465 S L12 AND (PRESS? OR SQUEEZ?)  
L25 1 FILE CAPLUS  
L26 0 FILE WPIDS  
L27 0 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L28 1 S (L16 AND L20 AND L24) — *priority*  
L29 6 FILE CAPLUS  
L30 1 FILE WPIDS  
L31 0 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L32 7 S L16 NOT L28  
L33 7 DUP REM L32 (0 DUPLICATES REMOVED)  
L34 7 FOCUS L33 1-  
L35 16 FILE CAPLUS  
L36 20 FILE WPIDS  
L37 1 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L38 37 S L20 AND (PRESS? OR SQUEEZ?)  
L39 14 FILE CAPLUS  
L40 8 FILE WPIDS  
L41 1 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L42 23 S L38 AND (PT OR PLATINUM?)  
L43 20 DUP REM L42 (3 DUPLICATES REMOVED) ◊  
L44 20 FOCUS L43 1-  
L45 14 S L44  
L46 6 S L34  
L47 14 FILE CAPLUS  
L48 6 S L44  
L49 1 S L34

L50	6 FILE WPIDS
L51	0 S L44
L52	0 S L34
L53	0 FILE COMPENDEX
TOTAL FOR ALL FILES	
L54	20 S L44 NOT L34
L55	20 FOCUS L54 1-
	E WILSON M S/AU
L56	23 FILE CAPLUS
L57	26 FILE WPIDS
L58	11 FILE COMPENDEX
TOTAL FOR ALL FILES	
L59	60 S E3-E4
L60	11 FILE CAPLUS
L61	12 FILE WPIDS
L62	8 FILE COMPENDEX
TOTAL FOR ALL FILES	
L63	31 S L59 AND (FUEL CELL?)
L64	1 FILE CAPLUS
L65	5 FILE WPIDS
L66	1 FILE COMPENDEX
TOTAL FOR ALL FILES	
L67	7 S L63 AND PRESS?
L68	7 FOCUS L67 1-
	E GOTTESFELD S/AU
L69	197 FILE CAPLUS
L70	21 FILE WPIDS
L71	86 FILE COMPENDEX
TOTAL FOR ALL FILES	
L72	304 S E3-E7
L73	97 FILE CAPLUS
L74	12 FILE WPIDS
L75	38 FILE COMPENDEX
TOTAL FOR ALL FILES	
L76	147 S L72 AND (FUEL CELL?)
L77	6 FILE CAPLUS
L78	2 FILE WPIDS
L79	2 FILE COMPENDEX
TOTAL FOR ALL FILES	
L80	10 S L76 AND PRESS?
L81	8 DUP REM L80 (2 DUPLICATES REMOVED)
L82	6 S L81
L83	1 S L68
L84	5 FILE CAPLUS
L85	2 S L81
L86	5 S L68
L87	2 FILE WPIDS
L88	0 S L81
L89	1 S L68
L90	0 FILE COMPENDEX
TOTAL FOR ALL FILES	
L91	7 S L81 NOT L68
L92	7 FOCUS L91 1-
	E WILSON MAHLON SCOTT/AU
L93	40 FILE CAPLUS
L94	0 FILE WPIDS
L95	8 FILE COMPENDEX
TOTAL FOR ALL FILES	
L96	48 S E1-E3
L97	34 FILE CAPLUS
L98	0 FILE WPIDS
L99	7 FILE COMPENDEX
TOTAL FOR ALL FILES	

L100 41 S L96 AND (FUEL CELL?)  
L101 4 FILE CAPLUS  
L102 0 FILE WPIDS  
L103 0 FILE COMPENDEX  
TOTAL FOR ALL FILES  
L104 4 S L100 AND PRESS?  
L105 4 FOCUS L104 1-

FILE 'USPATFULL, USPAT2' ENTERED AT 14:45:10 ON 31 MAY 2003

L106 240 FILE USPATFULL  
L107 4 FILE USPAT2  
TOTAL FOR ALL FILES  
L108 244 S 427/370000/NCL  
L109 2 FILE USPATFULL  
L110 0 FILE USPAT2  
TOTAL FOR ALL FILES  
L111 2 S L108 AND (FUEL CELL?)  
L112 742 FILE USPATFULL  
L113 21 FILE USPAT2  
TOTAL FOR ALL FILES  
L114 763 S 429/012000/NCL OR 429/042000/NCL  
L115 665 FILE USPATFULL  
L116 21 FILE USPAT2  
TOTAL FOR ALL FILES  
L117 686 S L114 AND (FUEL CELL?)  
L118 575 FILE USPATFULL  
L119 19 FILE USPAT2  
TOTAL FOR ALL FILES  
L120 594 S L117 AND (PRESS? OR SQUEEZ?)  
L121 12 FILE USPATFULL  
L122 1 FILE USPAT2  
TOTAL FOR ALL FILES  
L123 13 S L120 AND ((HYDROPHOBIC? OR NONPOLAR? OR APOLAR? OR (NON-POLAR  
L124 13 FOCUS L123 1-

=>

L34 ANSWER 1 OF 7 CAPLUS COPYRIGHT 2003 ACS  
 AN 1996:388536 CAPLUS  
 DN 125:38070  
 TI Manufacture of electrodes for solid polymer electrolyte **fuel cells**  
 IN Tada, Tomoyuki  
 PA Tanaka Precious Metal Ind, Japan; Watanabe Masahiro; Sutoharuto Asosheetsu Inc  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM H01M004-88  
 ICS B01J037-00; B01J037-02; H01M004-86; H01M008-02; H01M008-10  
 ICA B01J023-42  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 FAN.CNT 4

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 08115726	A2	19960507	JP 1994-277108	19941017
	US 5843519	A	19981201	US 1995-543632	19951016
PRAI	JP 1994-277108		19941017		
	JP 1994-332291		19941017		
	JP 1994-289288		19941028		
	JP 1994-289289		19941028		

AB The electrodes are prepd. by spray drying a dispersion of ground catalyst particles in an org. **solvent**, contg. **ion exchanger resin** and optionally a **hydrophobic resin**, to obtain **resin** coated catalyst granules and applying the granules on a substrate to form a catalyst layer. Preferably, the ground catalyst particles have diam. 0.1-10 .mu.m, the granules have diam. 1-50 .mu.m, the dispersion contains 0.5-15% solids, the spraying is carried out at 90-160.degree. and 0.8-1.5 kg/cm2 spraying pressure, and the solvent has b. ltoreq.160.degree..

ST solid polymer electrolyte **fuel cell** electrode; **fuel cell** electrode catalyst resin coating; electrode catalyst ion exchanger coating; hydrophobic resin coating electrode catalyst

IT Polyoxyalkylenes, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (fluorine- and sulfo-contg., **ionomers**, manuf. of **Nafion** coated catalyst granules contg. platinum loaded on carbon support for solid polymer electrolyte **fuel cell** electrodes)

IT Electrodes  
 (fuel-cell, manuf. of **Nafion** coated catalyst granules contg. platinum loaded on carbon support for solid polymer electrolyte **fuel cell** electrodes)

IT Fluoropolymers  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (polyoxyalkylene-, sulfo-contg., **ionomers**, manuf. of **Nafion** coated catalyst granules contg. platinum loaded on carbon support for solid polymer electrolyte **fuel cell** electrodes)

IT **Ionomers**  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (polyoxyalkylenes, fluorine- and sulfo-contg., manuf. of **Nafion** coated catalyst granules contg. platinum loaded on carbon support for solid polymer electrolyte **fuel cell** electrodes)

IT Drying  
 (spray, spray drying in manuf. of **Nafion** coated catalyst

granules contg. platinum loaded on carbon support for solid polymer electrolyte **fuel cell** electrodes)

IT 7440-06-4, Platinum, uses 7440-44-0, Carbon, uses  
RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process);  
PROC (Process); USES (Uses)

(manuf. of **Nafion** coated catalyst granules contg. platinum loaded on carbon support for solid polymer electrolyte **fuel cell** electrodes)

RN 7440-06-4

RN 7440-44-0

L34 ANSWER 2 OF 7 CAPLUS COPYRIGHT 2003 ACS

AN 1994:659704 CAPLUS

DN 121:259704

TI Manufacture of solid polymer electrolyte **fuel cells**

IN Seki, Tsutomu

PA Tokyo Gas Co Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M008-02

ICS H01M004-86; H01M004-88; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06203849	A2	19940722	JP 1992-358059	19921225
PRAI	JP 1992-358059		19921225		

AB The **fuel cells** are prepd. by mixing carbon black loaded Pt catalyst and a **ion exchanger resin** used as solid **polymer** electrolyte in a **solvent** to form a suspension, depositing the suspension on **hydrophobically** treated substrates to form electrode sheets, holding an **ion exchanger polymer** electrolyte membrane between an electrode sheet pair, and hot pressing.

ST solid polymer electrolyte **fuel cell**; polymer electrolyte **fuel cell** manuf

IT **Fuel cells**

(manuf. of solid polymer electrolyte **fuel cells**)

IT Carbon black, uses

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
(manuf. of solid polymer electrolyte **fuel cells**)

IT 7440-06-4, Platinum, uses

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
(manuf. of solid polymer electrolyte **fuel cells**)

IT 66796-30-3, **Nafion** 117

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(manuf. of solid polymer electrolyte **fuel cells**)

RN 7440-06-4

RN 66796-30-3

L34 ANSWER 3 OF 7 CAPLUS COPYRIGHT 2003 ACS

AN 1994:659705 CAPLUS

DN 121:259705

TI Manufacture of solid polymer electrolyte **fuel cells**

IN Seki, Tsutomu

PA Tokyo Gas Co Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M008-02  
ICS H01M004-86; H01M004-88; H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06203848	A2	19940722	JP 1992-358058	19921225
PRAI	JP 1992-358058		19921225		
AB	The <b>fuel cells</b> are prepd. by mixing carbon black loaded Pt catalyst and a <b>ion exchanger resin</b> used as solid <b>polymer</b> electrolyte in a <b>solvent</b> to form a slurry, applying the slurry to a <b>hydrophobically</b> treated electrode substrate, removing the <b>solvent</b> by evapn. to form an electrode sheet, and hot pressing an ion exchanger membrane between a pair of the electrode sheets.				
ST	solid polymer electrolyte <b>fuel cell</b> ; polymer electrolyte <b>fuel cell</b> manuf				
IT	<b>Fuel cells</b> (manuf. of solid polymer electrolyte <b>fuel cells</b> )				
IT	Carbon black, uses RL: CAT (Catalyst use); DEV (Device component use); USES (Uses) (manuf. of solid polymer electrolyte <b>fuel cells</b> )				
IT	7440-06-4, Platinum, uses RL: CAT (Catalyst use); DEV (Device component use); USES (Uses) (manuf. of solid polymer electrolyte <b>fuel cells</b> )				
IT	66796-30-3, <b>Nafion</b> 117 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses) (manuf. of solid polymer electrolyte <b>fuel cells</b> )				
RN	7440-06-4				
RN	66796-30-3				

L34 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2003 ACS  
AN 1999:392852 CAPLUS  
DN 131:33839

TI **Fuel cell** electrodes and their manufacture  
IN Yamada, Hiroshi  
PA Tokyo Gas Co., Ltd., Japan  
SO Jpn. Kokai Tokkyo Koho, 6 pp.  
CODEN: JKXXAF

DT Patent  
LA Japanese

IC ICM H01M004-86  
ICS H01M004-88; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11167925	A2	19990622	JP 1997-365849	19971222
PRAI	JP 1997-284428		19971001		
AB	The electrodes have a catalyst layer, formed on a porous gas diffusion layer, and are prepd. by evapg. a <b>solvent</b> from a suspension contg. catalyst particles, an electrolyte, and a <b>hydrophobic</b> agent under controlled temp. and pressure to maintain an evapn. rate of .apprx.8 cm3/min. The catalyst is preferably Pt, Pd, and/or their alloy loaded on C particles; the electrolyte is a perfluorocarbon sulfonic acid; the <b>hydrophobic</b> agent is polytetrafluoroethylene; the <b>solvent</b> is water and/or alc.; and the <b>fuel cells</b> are polymer electrolyte <b>fuel cells</b> .				
ST	<b>fuel cell</b> electrode catalyst layer manuf; evapn control <b>fuel cell</b> electrode manuf				
IT	Evaporation <b>Fuel cell</b> electrodes				

(controlled evapn. of solvents in manuf. of catalyst layers for polymer electrolyte **fuel cell** electrodes)

IT Carbon black, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (controlled evapn. of solvents in manuf. of catalyst layers for polymer electrolyte **fuel cell** electrodes)

IT Fluoropolymers, uses  
 RL: DEV (Device component use); USES (Uses)  
 (controlled evapn. of solvents in manuf. of catalyst layers for polymer electrolyte **fuel cell** electrodes)

IT 7440-06-4, Platinum, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (controlled evapn. of solvents in manuf. of catalyst layers for polymer electrolyte **fuel cell** electrodes)

IT 9002-84-0, Polytetrafluoroethylene 66796-30-3, **Nafion** 117  
 RL: DEV (Device component use); USES (Uses)  
 (controlled evapn. of solvents in manuf. of catalyst layers for polymer electrolyte **fuel cell** electrodes)

IT 64-17-5, Ethanol, processes 7732-18-5, Water, processes  
 RL: REM (Removal or disposal); PROC (Process)  
 (controlled evapn. of solvents in manuf. of catalyst layers for polymer electrolyte **fuel cell** electrodes)

RN 7440-06-4  
 RN 9002-84-0  
 RN 66796-30-3  
 RN 64-17-5  
 RN 7732-18-5

L34 ANSWER 5 OF 7 CAPLUS COPYRIGHT 2003 ACS

AN 1999:631497 CAPLUS

DN 131:259912

TI Membrane electrode assembly for polymer electrolyte membrane **fuel cell** and method for its manufacture

IN Zuber, Ralf; Fehl, Knut; Starz, Karl-anton; Stenke, Udo

PA Degussa-Huls A.-G., Germany

SO Eur. Pat. Appl., 13 pp.

CODEN: EPXXDW

DT Patent

LA German

IC ICM H01M008-10

ICS H01M004-92

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 37, 67

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 945910	A2	19990929	EP 1999-104630	19990309
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	DE 19812592	A1	19991007	DE 1998-19812592	19980323
	US 6309772	B1	20011030	US 1999-274018	19990322
	JP 11329452	A2	19991130	JP 1999-77861	19990323
	BR 9900605	A	20000606	BR 1999-605	19990323
PRAI	DE 1998-19812592	A	19980323		

AB The membrane electrode assembly of the **fuel cell** comprises a polymer electrolyte membrane with porous reaction layers contg. catalysts and **ionomers** on both sides of the membrane. The reaction layer has an inhomogeneous microstructure formed from an **ionomer**-impregnated and embedded catalyst portion and an **ionomer**-free catalyst portion in wt. ratio (1-20):1, esp. (3-10):1. The catalyst can be carbon-supported Pt-group metal or alloy particles. The reaction layer has pore vol. 0.7-1.3, esp. 0.8-1.2 mL/g, for pores with diam. 0.03-1 .mu.m, and thickness 5-100, esp. 10-100 .mu.m.

The **ionomer** can be a proton-conducting tetrafluoroethylene-fluorovinylether copolymer contg. acid groups, e.g., **Nafion**.

ST membrane electrode assembly PEM **fuel cell**; polymer electrolyte membrane **fuel cell**

IT Carbon black, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst supports; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Platinum-group metals  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalysts; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Glycols, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (ethers, solvents; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Polyoxyalkylenes, uses  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (fluorine- and sulfo-contg., **ionomers**, proton-conducting; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Polyoxyalkylenes, uses  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (fluorine-contg., sulfo-contg., **ionomers**, proton-conducting; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Ethers, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (glycol, solvents; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT **Fuel cell** electrolytes  
 (polymer membranes; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT **Fuel cells**  
 (polymer-electrolyte-membrane; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Fluoropolymers, uses  
 Fluoropolymers, uses  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (polyoxyalkylene-, sulfo-contg., **ionomers**, proton-conducting; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT **Ionomers**  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (polyoxyalkylenes, fluorine- and sulfo-contg., proton-conducting; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Fluoropolymers, uses  
**Ionomers**  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (proton-conducting; membrane electrode assembly for polymer electrolyte membrane **fuel cells**)

IT Alcohols, uses  
 Glycols, uses  
 Hydrocarbons, uses  
 Paraffin oils  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (solvents; membrane electrode assembly for polymer electrolyte membrane

**fuel cells)**

IT **Solvents**  
 (weakly polar; **nonpolar**; membrane electrode assembly for  
 polymer electrolyte membrane **fuel cells**)

IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6,  
 Rhodium, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalysts; membrane electrode assembly for polymer electrolyte  
 membrane **fuel cells**)

IT 77950-55-1, **Nafion** 115  
 RL: DEV (Device component use); TEM (Technical or engineered material  
 use); USES (Uses)  
 (membranes; membrane electrode assembly for polymer electrolyte  
 membrane **fuel cells**)

IT 7439-89-6, Iron, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel,  
 uses 7440-18-8, Ruthenium, uses 7440-33-7, Tungsten, uses 7440-47-3,  
 Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses  
 7440-62-2, Vanadium, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (platinum group metals alloyed with, catalysts; membrane electrode  
 assembly for polymer electrolyte membrane **fuel cells**  
 )

IT 116-14-3D, Tetrafluoroethylene, fluorovinylether copolymers,  
 functionalized 57578-63-9D, Perfluorovinylether-tetrafluoroethylene  
 copolymer, functionalized  
 RL: DEV (Device component use); TEM (Technical or engineered material  
 use); USES (Uses)  
 (proton-conducting; membrane electrode assembly for polymer electrolyte  
 membrane **fuel cells**)

IT 56-81-5, 1,2,3-Propanetriol, uses 57-55-6, 1,2-Propanediol, uses  
 107-41-5, Hexylene glycol 110-38-3, Decanoic acid, ethyl ester  
 111-82-0, Dodecanoic acid, methyl ester 463-79-6D, Carbonic acid, alkyl  
 esters, uses 25265-71-8, Dipropylene glycol  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (solvents; membrane electrode assembly for polymer electrolyte membrane  
**fuel cells**)

RN 7440-05-3  
 RN 7440-06-4  
 RN 7440-16-6  
 RN 77950-55-1  
 RN 7439-89-6  
 RN 7439-98-7  
 RN 7440-02-0  
 RN 7440-18-8  
 RN 7440-33-7  
 RN 7440-47-3  
 RN 7440-48-4  
 RN 7440-50-8  
 RN 7440-62-2  
 RN 116-14-3D  
 RN 57578-63-9D  
 RN 56-81-5  
 RN 57-55-6  
 RN 107-41-5  
 RN 110-38-3  
 RN 111-82-0  
 RN 463-79-6D  
 RN 25265-71-8

L34 ANSWER 6 OF 7 CAPLUS COPYRIGHT 2003 ACS

AN 2001:78453 CAPLUS

DN 134:148631

TI Fluid composition for producing and repairing ion-exchange membranes

IN Blach Vizoso, Ricardo; Timofeev, Sergei; Bobrova, Lyubov; Fateev, Vladimir  
 PA David Systems Technology, S.L., Spain  
 SO PCT Int. Appl., 29 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA Spanish  
 IC ICM C08L027-18  
 ICS C08L027-12  
 CC 38-3 (Plastics Fabrication and Uses)  
 Section cross-reference(s): 48, 52, 67, 72

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001007517	A1	20010201	WO 1999-ES278	19990827
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	ES 2154231	A1	20010316	ES 1999-1653	19990722
	ES 2154231	B1	20011201		
	AU 9957473	A1	20010213	AU 1999-57473	19990827
	EP 1209197	A1	20020529	EP 1999-944645	19990827
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				
	BR 9917416	A	20020702	BR 1999-17416	19990827
	JP 2003505569	T2	20030212	JP 2001-512793	19990827
PRAI	ES 1999-1653	A	19990722		
	WO 1999-ES278	W	19990827		
AB	The fluid compn. contains 1-35 wt.% of a perfluorinated ion-exchange copolymer with functional groups SO <sub>3</sub> M (M = H, alkali metal) having equiv. wt. >900 and 65-99% of a polar org. <b>solvent</b> or its mixt. with a <b>nonpolar solvent</b> . The perfluorinated ion-exchange copolymer has crystallinity 2-10% and the ratio of its d. to that of the fluoropolymer without sulfo groups is 0.9-0.97. Such compns. are used in the prodn. and repair of ion-exchange membranes which are used in electrolysis for manuf. of chlorine and caustic or in water electrolysis in fuel/gas sepn. cells. A 2% soln. of SPL 2 [84:16 copolymer of tetrafluoroethylene with CF <sub>2</sub> :CFOCF <sub>2</sub> CF(CF <sub>3</sub> )OCF <sub>2</sub> CF <sub>2</sub> SO <sub>3</sub> H] in iso-PrOH was used in the manuf. of a <b>fuel cell</b> electrode.				
ST	<b>ion exchange resin</b> repair soln; <b>ionomer</b> perfluoro sulfonated ion exchanger; <b>fuel cell</b> membrane cation exchanger				
IT	Cation exchange membranes				
	(fluid compn. for producing and repairing ion-exchange membranes)				
IT	Fluoropolymers, uses				
	RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses) (fluid compn. for producing and repairing ion-exchange membranes)				
IT	Dealkylation catalysts				
	(fluid compn. for producing and repairing ion-exchange membranes for use as)				
IT	Electrolysis				
	<b>Fuel cells</b>				
	Hygrometers				
	(fluid compn. for producing and repairing ion-exchange membranes for use in)				
IT	Membranes, nonbiological				
	(semipermeable; fluid compn. for producing and repairing ion-exchange				

membranes for use as)

IT 128-37-0, 2,6-Di-tert-butyl-4-methylphenol, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (dealkylation catalysts for)

IT 2409-55-4P, 2-tert-Butyl-4-methylphenol  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (dealkylation catalysts for manuf. of)

IT 31176-88-2, SPL 1  
 RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process);  
 PROC (Process); USES (Uses)  
 (fluid compn. for producing and repairing ion-exchange membranes)

IT 31175-20-9, SPL 2 278616-83-4, SPL 4 324011-45-2, SPL 6  
 RL: DEV (Device component use); PEP (Physical, engineering or chemical  
 process); PROC (Process); USES (Uses)  
 (fluid compn. for producing and repairing ion-exchange membranes)

IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 67-63-0, Isopropyl  
 alcohol, uses 67-64-1, Acetone, uses 67-68-5, DMSO, uses 68-12-2,  
 DMF, uses 71-23-8, 1-Propanol, uses 71-43-2, Benzene, uses 78-83-1,  
 Isobutyl alcohol, uses 78-93-3, Methyl ethyl ketone, uses 108-88-3,  
 Toluene, uses 108-94-1, Cyclohexanone, uses 109-66-0, Pentane, uses  
 110-54-3, Hexane, uses 127-19-5, N,N-Dimethylacetamide 142-82-5,  
 Heptane, uses 594-41-2, 2-Bromo-1,1,1-trichloroethane 761-65-9,  
 N,N-Dibutylformamide  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (fluid compn. for producing and repairing ion-exchange membranes)

IT 269080-43-5, SPL 7 324011-44-1, SPL 3  
 RL: POF (Polymer in formulation); USES (Uses)  
 (fluid compn. for producing and repairing ion-exchange membranes)

IT 7664-39-3, Hydrogen fluoride, processes  
 RL: REM (Removal or disposal); PROC (Process)  
 (membranes for sepn. from halocarbons of)

IT 354-21-2, 1,2,2-Trichloro-1,1-difluoroethane 354-23-4,  
 1,2-Dichloro-1,1,2-trifluoroethane 1649-08-7, 1,2-Dichloro-1,1-  
 difluoroethane  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (membranes for sepn. of HF from)

IT 76-13-1P, 1,1,2-Trichloro-1,2,2-trifluoroethane  
 RL: NUU (Other use, unclassified); PUR (Purification or recovery); PREP  
 (Preparation); USES (Uses)  
 (membranes for sepn. of HF from)

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Asahi Glass Company Ltd; EP 0025644 A 1981 CAPLUS
- (2) Michael, J; US 4386987 A 1983 CAPLUS
- (3) Walther, G; US 4453991 A 1984 CAPLUS

RN 128-37-0  
 RN 2409-55-4P  
 RN 31176-88-2  
 RN 31175-20-9  
 RN 278616-83-4  
 RN 324011-45-2  
 RN 64-17-5  
 RN 67-56-1  
 RN 67-63-0  
 RN 67-64-1  
 RN 67-68-5  
 RN 68-12-2  
 RN 71-23-8  
 RN 71-43-2  
 RN 78-83-1  
 RN 78-93-3  
 RN 108-88-3  
 RN 108-94-1

RN 109-66-0  
RN 110-54-3  
RN 127-19-5  
RN 142-82-5  
RN 594-41-2  
RN 761-65-9  
RN 269080-43-5  
RN 324011-44-1  
RN 7664-39-3  
RN 354-21-2  
RN 354-23-4  
RN 1649-08-7  
RN 76-13-1P

L34 ANSWER 7 OF 7 WPIDS (C) 2003 THOMSON DERWENT  
AN 2001-102762 [11] WPIDS  
DNN N2001-076259 DNC C2001-030126  
TI Electrode-membrane combination for use in fuel cell of  
transportation vehicle, comprises electrode-membrane interfacial regions  
comprising zone(s) of specific thickness, which contain catalytically  
active metals.  
DC A35 A85 L03 M13 X16 X21  
IN ARPS, J H; CAVALCA, C A; MURTHY, M; CAVALCA, C  
PA (GORE) GORE ENTERPRISE HOLDINGS INC; (ARPS-I) ARPS J H; (CAVA-I) CAVALCA C  
A; (MURT-I) MURTHY M; (GORE) GORE ENTERPRISE HOLDINGS  
CYC 80  
PI WO 2000079630 A2 20001228 (200111)\* EN 125p H01M008-10  
RW: AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE  
W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE  
GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG  
MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG  
UZ VN YU ZW  
AU 2000057440 A 20010109 (200122) H01M008-10  
US 6300000 B1 20011009 (200162) H01M004-86  
US 2001033960 A1 20011025 (200170) H01M004-94  
EP 1201002 A2 20020502 (200236) EN H01M008-10  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI  
CN 1370334 A 20020918 (200303) H01M008-10  
JP 2003502829 W 20030121 (200308) 145p H01M004-86  
ADT WO 2000079630 A2 WO 2000-US16645 20000616; AU 2000057440 A AU 2000-57440  
20000616; US 6300000 B1 US 1999-335718 19990618; US 2001033960 A1 Cont of  
US 1999-335718 19990618, US 2001-827894 20010409; EP 1201002 A2 EP  
2000-942876 20000616, WO 2000-US16645 20000616; CN 1370334 A CN  
2000-811793 20000616; JP 2003502829 W WO 2000-US16645 20000616, JP  
2001-505094 20000616  
FDT AU 2000057440 A Based on WO 200079630; EP 1201002 A2 Based on WO  
200079630; JP 2003502829 W Based on WO 200079630  
PRAI US 1999-335718 19990618; US 2001-827894 20010409  
IC ICM H01M004-86; H01M004-94; H01M008-10  
ICS C23C014-14; H01M004-88; H01M004-90; H01M004-92; H01M004-96;  
H01M008-00; H01M008-02  
AB WO 200079630 A UPAB: 20010224  
NOVELTY - An electrode-membrane combination comprises reactant diffusive,  
electronically conductive electrodes (1, 3) comprising catalytically  
active metal(s) (A) and ionically conductive polymer(s). Ionically  
conductive membrane(s) (2) contact the electrode to form  
electrode-membrane interfacial regions (4,5) comprising zone(s) of  
thickness 3-5000 Angstrom , which contain different catalytically active  
metals (B).  
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for  
membrane-electrode assembly comprising the electrode-membrane combination  
and at least one additional, different electrode contacting the membrane.

USE - For membrane-electrode assembly of **fuel cell** used in transportation vehicle (all claimed) such as car, bus, trucks; stationary power applications; portable power applications such as portable television, fans and other consumer products.

ADVANTAGE - The electrode-membrane combination provides improved power output and resistance to poisoning, during **fuel cell** operation. The ionically conductive membrane provides strength, high ionic conductance and good interfacial contact with the electrode. The membrane damage caused by hot pressing of electrode with membrane is prevented. Inexpensive **fuel cell** of high power density, low cost, high efficiency and durability, is enabled.

DESCRIPTION OF DRAWING(S) - The figure shows the cross-section of membrane-electrode assembly.

Electronically conductive electrodes 1,3

Polymeric membrane 2

Interfacial regions 4,5

Dwg. 1/62

FS CPI EPI

FA AB; GI

MC CPI: A12-E06B; A12-T04C; A12-W11K; L03-E04; L03-H05; M13-H05

EPI: X16-C01C; X16-E06A; X16-F02; X21-A01F; X21-B01A

=>

L55 ANSWER 1 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1999:422482 CAPLUS

DN 131:150608

TI Preparation and performance evaluation of membrane electrode assemblies for polymer electrolyte **fuel cell**

AU Peck, D.-H.; Chun, Y.-G.; Kim, C.-S.; Jung, D.-H.; Shin, D.-R.

CS Korea Institute of Energy Research, Taejon, 305-343, S. Korea

SO Journal of New Materials for Electrochemical Systems (1999), 2(2), 121-124  
CODEN: JMESFQ; ISSN: 1480-2422

PB Journal of New Materials for Electrochemical Systems

DT Journal

LA English

AB In order to evaluate performance characteristics of the membrane electrode assembly (MEA) for polymer electrolyte **fuel cell**

(PEFC), three com. available **Nafion** membranes (112, 115, and 117), and **Pt/C**, **PtNi/C** and **PtNiCo/C** electrocatalysts were used in the fabrication of the MEAs by using transfer **printing** technique. The electrocatalyst layer of the MEA has been made by using a slurry of carbon-supported catalyst, **Nafion-ionomers** and glycerin. The effects of the thickness of **Nafion** membranes, electrocatalysts and the operating conditions (i.e. temp., reactant gas **pressure**, and compn.) on the performance of the MEA were investigated in the PEFC single cell. The performance of the MEA made from **Nafion** 112, 115, and 117 membrane for O<sub>2</sub>/H<sub>2</sub> cell were 1.16, 0.82, and 0.54 A/cm<sup>2</sup> at 0.6V. An increase of reactants **pressures** up to 3 atm has stronger effect on the performance of Air/H<sub>2</sub> cell than on that of O<sub>2</sub>/H<sub>2</sub> cell. The performances of the MEA made from PtNi/C alloy catalyst for O<sub>2</sub>/H<sub>2</sub> and Air/H<sub>2</sub> cells at 80.degree. were 0.86 and 0.48 A/cm<sup>2</sup> at 0.6V, resp., and in the case of PtNiCo/C alloy catalyst, the MEAs for O<sub>2</sub>/H<sub>2</sub> and Air/H<sub>2</sub> cells showed similar performance.

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 2 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1998:216367 CAPLUS

DN 129:46606

TI A rapid half-cell technique for the pre-**screening** of polymer **fuel cell** catalysts

AU Tamizhmani, G.; Dodelet, J. P.; Guay, D.; Dignard-Bailey, L.

CS Natural Resources Canada, CANMET-Energy Diversification Research Laboratory, Varennes, QC, J3X 1S6, Can.

SO Journal of Electroanalytical Chemistry (1998), 444(1), 121-125  
CODEN: JECHES; ISSN: 0368-1874

PB Elsevier Science S.A.

DT Journal

LA English

AB Four **platinum**-based catalysts with different catalytic activity for the oxygen redn. reaction were prepd. and tested in polymer **fuel cells** (PFCs) and in half-cells with H<sub>2</sub>SO<sub>4</sub> and HF electrolytes. The activity results of PFCs at 0.9 V vs. RHE (reversible hydrogen electrode) can be mimicked in parallel by the results obtained in HF electrolyte but not by the results obtained in H<sub>2</sub>SO<sub>4</sub> electrolyte. This paper concludes that the pre-**screening** of a huge no. of **Pt**-based catalysts for the selection of potential catalysts for the PFCs can be carried out by a rapid half-cell technique with a nonadsorbing electrolyte such as HF.

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 3 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1993:84416 CAPLUS

DN 118:84416  
 TI Membrane catalyst layer for **fuel cells**  
 IN Wilson, Mahlon Scott  
 PA United States Dept. of Energy, USA  
 SO PCT Int. Appl., 29 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9215121	A1	19920903	WO 1992-US1058	19920218
	W: CA, JP				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE				
	<del>US 656329</del>	A0	19930501	US 1991-656329	19910219
	<del>US 5234777</del>	A	19930810	US 1991-736876	19910729
	JP 05507583	T2	19931028	JP 1992-507039	19920218
	EP 600888	A1	19940615	EP 1992-907218	19920218
	EP 600888	B1	19970827		
	R: DE, FR, GB				
PRAI	US 1991-656329		19910219		
	US 1991-736876		19910729		
	WO 1992-US1058		19920218		

AB **Fuel cells** incorporate a .ltorsim.10-.mu.m catalyst layer between a solid polymer electrolyte membrane and a porous electrode backing. The catalyst layer has C-supported **Pt** catalyst loading >0.1 and .ltorsim.0.35 mg **Pt**/cm<sup>2</sup>. The layer is formed as an **ink** that is spread and cured on a film-release blank. The cured film is transferred to the membrane and hot **pressed** into the surface to form a catalyst layer having a controlled thickness and catalyst distribution. Alternately, the catalyst layer is formed by applying a Na<sup>+</sup> form of a perfluorosulfonate **ionomer** directly to the membrane, drying the film at .gtoreq.150.degree., and then converting the film back to the protonated form of the **ionomer**. The layer has an adequate gas permeability so that the cell performance is not affected and has an effective d. and particle distribution to optimize proton access to the catalyst and electronic continuity for electron flow from the half-cell reaction occurring at the catalyst.

L55 ANSWER 4 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1992:87618 CAPLUS

DN 116:87618

TI Thin-film catalyst layers for polymer electrolyte **fuel cell** electrodes

AU Wilson, M. S.; Gottesfeld, S.

CS Electron. Res. Group, Los Alamos Natl. Lab., Los Alamos, NM, 87545, USA

SO Journal of Applied Electrochemistry (1992), 22(1), 1-7

CODEN: JAELEBJ; ISSN: 0021-891X

DT Journal

LA English

AB New structures for the **Pt**/C catalyst layer of polymer electrolyte **fuel cell** electrodes have been developed that substantially increase the utilization efficiency of the catalyst. Fabricating the catalyst layers and gas diffusion backings sep. makes it possible to formulate each structure with the properties that are most suitable for its function. In the case of the catalyst layer, the optimal properties are hydrophilicity, thinness, uniformity, and the proper ratio of **ionomer** and supported catalyst. The catalyst layers are cast from soln. as thin films that utilize the **ionomer** itself as a binder. The thin films are hot **pressed** directly onto the **ionomer** membranes, and the hydrophobic gas diffusion backings are inserted when the cells are assembled. The performances of **fuel cells** based on the thin film catalyst layers are comparable with

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*have*

those of gas diffusion electrode designs that utilize several times as much Pt, thus the specific activities of the Pt catalyst in the new structures are significantly higher.

L55 ANSWER 5 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1963:473643 CAPLUS

DN 59:73643

OREF 59:13602h,13603a

TI Fuel cell

IN Grubb, Willard T., Jr.

PA Electric Co.

SO 5 pp.

DT Patent

LA Unavailable

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	US 2913511	19591117	US	19550629
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AB A gaseous **fuel cell** contg. an **ion-exchange resin** membrane as the electrolyte and operable at room temp. and atm. **pressure** is described. The electrodes in the form of sheets or **screens** are prepd. from conductive materials which can absorb the fuel employed and act as a catalyst. For example, Amberplex C-1 cation-permeable membrane, 0.025 in. thick, is placed between two 0.0005-in. thick **Pt** sheets. The area of contact between the electrodes and the membrane is 25 sq. cm. When H is supplied to the anode and O to the cathode, the cell has an open-circuit voltage of 0.95 v. and delivers a current of 10 ma. at 0.65 v.

L55 ANSWER 6 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1999:511087 CAPLUS

DN 131:146953

TI A method of forming a membrane electrode assembly for a direct-feed **fuel cell**

IN Kindler, Andrew; Dawson, Stephen F.

PA California Institute of Technology, USA

SO PCT Int. Appl., 22 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	WO 9939840	A1	19990812	WO 1999-US2835	19990209
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W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

AU	9925961	A1	19990823	AU 1999-25961	19990209
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EP	1054739	A1	20001129	EP 1999-905918	19990209
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R: DE, FR, GB, NL

PRAI	US 1998-21694	A	19980210
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WO	1999-US2835	W	19990209
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AB A catalyst-coated electrode for a **fuel cell** is prepd. by mixing a catalyst (e.g., **Pt** or **Pt-Ru**) with a water repellent material (e.g., PTFE) to form a catalyst **ink** that is applied to an electrode backing material (e.g., porous carbon fiber sheet). The coated electrode is sintered under N<sub>2</sub>, cooled to 25.degree.C, then coated with a liq. **ionomer** (e.g., **Nafion**--a perfluorovinylether sulfonic acid-tetrafluoroethylene copolymer) forming

an anode or cathode. A solid electrolyte membrane, e.g., a perfluorinated proton exchange membrane, is pretreated (with isopropanol) to soften and swell the membrane prior to hot **press** bonding between the anode and cathode to form a membrane electrode assembly. Swelling the membrane before bonding results in shrinkage at the interface during use, reducing delamination. The electrode assembly can be used in a direct-feed methanol **fuel cell**.

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 7 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1999:511088 CAPLUS

DN 131:146954

TI Direct deposit of catalyst on the membrane of direct-feed **fuel cells**

IN Chun, William; Narayanan, Sekharipuram R.; Jeffries-Nakamura, Barbara; Valdez, Thomas I.; Linke, Juergen

PA California Institute of Technology, USA

SO PCT Int. Appl., 36 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9939841	A1	19990812	WO 1999-US2836	19990209
	W:	AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM,			
	RW:	GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			
	US 6221523	B1	20010424	US 1998-21692	19980210
	AU 9925962	A1	19990823	AU 1999-25962	19990209
	EP 1054740	A1	20001129	EP 1999-905919	19990209
	R:	DE, FR, GB, NL			
	US 2001052389	A1	20011220	US 2001-933684	20010820
PRAI	US 1998-21692	A	19980210		
	WO 1999-US2836	W	19990209		
	US 1999-428123	A3	19991026		

AB A solid membrane electrolyte and membrane electrode assembly are prepd. for a direct liq.-feed **fuel cell**, resulting in improved catalyst use and an improved catalyst/membrane interface. The catalyst layer is applied directly onto the solid electrolyte membrane as an **ink**. The catalyst **ink** is prepd. by mixing a catalyst (e.g., **Pt** or **Pt-Ru**) with a water repellent material (e.g., PTFE) and an **ionomer** (**Nafion**) soln. The solid electrolyte membrane, e.g., a perfluorinated proton exchange membrane, is pretreated (with isopropanol) to soften and swell the membrane prior to coating. The pretreated membrane is held in a frame and the catalyst **ink** is poured or sprayed directly onto the membrane surface and then spread with a glass rod. The coated membrane is dried by slow evapn. Support substrates (e.g., carbon paper) are placed on each side of the catalyst-coated membrane, then the layers are bonded by hot **pressing** to form the membrane electrode assembly. The membrane electrode assembly can be used in a direct-feed methanol **fuel cell**.

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 8 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 2002:579507 CAPLUS  
 DN 137:386984  
 TI In situ voltammetric characterization of PEM **fuel cell**  
 catalyst layers  
 AU Kumpulainen, Heikki; Peltonen, Terttu; Koponen, Ulla; Bergelin, Mikael;  
 Valkiainen, Matti; Wasberg, Mikael  
 CS VTT Processes, FIN-02044, Finland  
 SO VTT Tiedotteita (2002), 2137, 1-28, 1/1-1/4  
 CODEN: VTIEEE; ISSN: 1235-0605  
 DT Report  
 LA English  
 AB In our work we have studied inhouse made membrane electrode assembly (MEA)  
 (geometric area 5 cm<sup>2</sup>) based on com. (E-TEK, Inc.) carbon supported  
**Pt** and **Pt/Ru** catalysts. A **Nafion** 115 membrane  
 was coated with **ink** contg. **Pt/C** catalyst and  
**Nafion** soln. and dried layers were sintered by hot  
**pressing**. After post-processing the membranes were installed in a  
 single cell test fixture. In addn., the **ink** used for coating  
 was characterized in thin film form in sulfuric acid electrolyte and the  
 results were compared to the **fuel cell** data.  
 Current-voltage characteristics were measured after a running-in period of  
 about 16 h. After cooling the test fixture down to room temp. the cyclic  
 voltammograms were taken in situ by using a two-electrode potentiostatic  
 measurement circuit. The electrode under study is purged by an inert gas  
 (N<sub>2</sub>) while the other electrode is purged by hydrogen gas so as to form a  
 reversible hydrogen electrode. In this manner the surface processes  
 taking place on both the anode and cathode side of the MEA could be  
 measured and evaluated. From the hydrogen desorption charge on **Pt**  
 the available **Pt** surface area has been detd. and the ratio  
 between measured area and calcd. total **Pt** area was in the range  
 of 30%. The ratios between electrochem. surface areas on the anode and  
 cathode side compare well with the corresponding ratios obtained from  
 calcns. of total added **Pt** surface area. The relation between  
 the voltammetrically obtained surface areas and the polarization data  
 (current-voltage curves) is discussed. An enlargement of the active  
 surface area could be noted after potential scans into the **Pt**  
 oxide formation region. This indicates the presence of a deactivation  
 process, probably due to adsorbed org. material removed oxidatively during  
 the extended polarization. When MEAs based on **Pt/Ru** alloy  
 catalysts were measured the hydrogen adsorption charge decreased as a  
 result of the lower hydrogen adsorption capability of Ru. In the double  
 layer region the formation of Ru-oxides was also well manifested.

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 9 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 2001:73418 CAPLUS  
 DN 134:103343  
 TI Method for fabricating membrane and electrode assembly for polymer  
 electrolyte membrane **fuel cells**  
 IN Kim, Chang-Soo; Chun, Young-Gap; Peck, Dong-Hyun; Shin, Dong Ryul  
 PA Korea Institute of Energy Research, S. Korea  
 SO U.S., 8 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6180276	B1	20010130	US 1998-149088	19980908
PRAI	KR 1998-5531	A	19980223		
AB	A method is disclosed for fabricating an electrode and membrane assembly (MEA) for polymer electrolyte membrane <b>fuel cells</b> .				

The MEA comprises a polymer electrolyte membrane on each side of which an electrocatalyst layer is provided in a melted state. A perfluorosulfonyl fluoride copolymer powder ranging, in particle size distribution, from 20 to 200 .mu.m is hot-pressed at 200-250.degree. to give a pre-formed sheet whose opposite sides are then coated with a catalyst ink consisting of Pt/C powder, glycerol and water. This catalyst ink-coated preformed sheet is again subjected to hot pressing at 200-250.degree. to embed the catalyst ink into the pre-formed sheet. Hydrolysis in NaOH/methanol or H2SO4 soln. converts the membrane of the sheet from a non-ionized form to an ionized form.

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 10 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 2001:320269 CAPLUS

DN 134:329056

TI Production of catalytic coatings on membranes suitable for low-temp. fuel cells

IN Gupta, Ashok Kumar; Tietz, Frank; Buchkremer, Hans Peter; Kundler, Isabel  
PA Forschungszentrum Juelich G.m.b.H., Germany

SO PCT Int. Appl., 18 pp.

CODEN: PIXXD2

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001031725	A1	20010503	WO 2000-EP10129	20001014
	W: CA, JP, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	EP 1236233	A1	20020904	EP 2000-969506	20001014
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY				

PRAI DE 1999-19951936 A 19991028  
WO 2000-EP10129 W 20001014

AB A membrane, coated by a catalytic active coating, is suitable for low-temp. fuel cells. The prepn. of the membrane is carried out by several steps: (1) prodn. of a paste consisting of a non-polar solvent, catalytic active material, as well as a polymeric soln., (2) laminar coating, esp. by silk screen printing, of the paste on a polymer membrane with a thickness of 10-100 .mu.m, (3) drying of the paste at 30-80.degree. and pressing with the membrane. The membrane coated with the paste is pressed at 100-150.degree., whereby the solvent is volatile and the catalytic active material is fixed on the membrane. A binder, or plasticizer is added to the paste. Nafion is used as polymer, platinum as catalyst, and terpeneol as solvent. The paste comprises solids 10-50, preferably 20-30, binder 0-10, preferably 1-2, plasticizer 0-5, preferably 1-2 wt.%, and the rest is solvent. Optionally, the paste contains 60-80 wt.% solvent. The use of non-polar solvent prevents swelling of the membrane.

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 11 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 2002:69613 CAPLUS

DN 136:121086

TI Manufacture of electrode-electrolyte composites for fuel cells and substrates therefor

IN Inuzuka, Kyoko

PA Toyota Motor Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 8 pp.  
CODEN: JKXXAF  
DT Patent  
LA Japanese  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002025578	A2	20020125	JP 2000-210739	20000712
PRAI	JP 2000-210739		20000712		

AB The composites are manufd. by applying an **ink** contg. catalysts on a porous substrate, **pressing** the substrate with a polymer electrolyte membrane, and sending a fluid (e.g., compressed air) to the substrate to remove the substrate from the catalyst **ink**. Preferably, the substrate has a surface roughness of water contact angle .gtoreq.120.degree.. The process prevents damaging of the catalyst layer as the electrode.

L55 ANSWER 12 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 2002:810059 CAPLUS

DN 138:139989

TI Novel polymer electrolytes for microfabricated **fuel cells**

AU Wainright, J. S.; Litt, M. H.; Zhang, Y.; Liu, C. C.; Savinell, R. F.  
CS Department of Chemical Engineering, Case Western Reserve University, Cleveland, OH, 44106-7217, USA

SO Proceedings - Electrochemical Society (2001), 2000-22(Power Sources for the New Millennium), 14-22

CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

AB The objective of this research is to produce a hydrogen fueled, air-breathing **fuel cell** by combining microfabrication techniques with polymer electrolyte **fuel cell** technol. Ideally, this will result in a low cost, easily manufd. device suitable for low power (.mu.W to mW) applications. It is envisioned that this device would operate in a passive mode, without active control of temp., humidity, reactant **pressure** or flow rate. The properties of the polymer electrolyte are crit. for successful operation under these conditions. One family of electrolytes under consideration are polyimide copolymers in which one of the monomers contains a sulfonic acid functionality to provide proton cond. and a nonionic monomer will provide dimensional stability. These electrolytes have enhanced cond. at low relative humidities and low permeability to hydrogen and oxygen, necessary requirements for a completely passive device.

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 13 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 2000:665700 CAPLUS

DN 133:225598

TI Method for applying electrode layers on a tape-like polymer electrolyte membrane for **fuel cells**

IN Starz, Karl-Anton; Zuber, Ralf; Gottenauer, Wolfgang; Fehl, Knut; Diehl, Manfred

PA Degussa-Huels Aktiengesellschaft, Germany

SO Eur. Pat. Appl., 15 pp.

CODEN: EPXXDW

DT Patent

LA German

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI EP 1037295 A1 20000920 EP 1999-108791 19990503  
 EP 1037295 B1 20010613  
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
 IE, SI, LT, LV, FI, RO  
 DE 19910773 A1 20000928 DE 1999-19910773 19990311  
 ES 2159978 T3 20011016 ES 1999-108791 19990503  
 CA 2300226 AA 20000911 CA 2000-2300226 20000309  
 JP 2000268829 A2 20000929 JP 2000-67017 20000310  
 PRAI DE 1999-19910773 A 19990311

AB In the title method, the front and back sides of the membrane (in the desired pattern) are continuously **pressed** with the electrode layers under application of an electrocatalyst-contg. **ink**, and the **pressed** electrode layers are dried at a high temp. immediately after the **press** process. By **pressing** under maintenance of a correct position arrangement of the pattern the electrode layers of front and back sides are formed to each other.

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 14 OF 20 WPIDS (C) 2003 THOMSON DERWENT

AN 2002-682608 [73] WPIDS

DNN N2002-538987 DNC C2002-192473

TI **Inks** for making anode and cathode catalysts for **ionomeric** membranes of direct methanol fuels, includes **platinum** and **platinum**-ruthenium catalysts, purified water, and perfluorosulfonic acid **ionomer**.

DC A85 G02 J04 L03 X16

IN DAVEY, J; GOTTESFELD, S; REN, X; THOMAS, S C; ZELENAY, P

PA (REGC) UNIV CALIFORNIA

CYC 94

PI WO 2002045188 A2 20020606 (200273)\* EN 20p

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
 NL OA PT SD SE SL SZ TR TZ UG ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK  
 DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ  
 LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD  
 SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

AU 2002039439 A 20020611 (200273)

ADT WO 2002045188 A2 WO 2001-US45619 20011031; AU 2002039439 A AU 2002-39439 20011031

FDT AU 2002039439 A Based on WO 200245188

PRAI US 2000-715211 20001114

AB WO 200245188 A UPAB: 20021113

NOVELTY - **Inks** comprise a **platinum** catalyst for a cathode catalyst and a **platinum**-ruthenium catalyst for an anode catalyst, purified water which is 4-20 times that of the catalyst by weight, and a perfluorosulfonic acid **ionomer** in an amount effective to provide an **ionomer** content in dried anode and cathode catalyst coats of 20-80 vol.%.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(a) the production of **inks** for use in anode and cathode catalysts applied to membranes for direct methanol **fuel cells**, comprising combining **platinum** or **platinum**-ruthenium catalysts with purified water to form a first mixture, cooling the first mixture to a temperature that reduces evaporation of water from the first mixture, placing the first mixture in a cooler and agitating the mixture to obtain a first homogeneous suspension, adding an alcoholic solution of perfluorosulfonic acid to the first homogeneous suspension to provide a second mixture, agitating the second mixture in the cooler to obtain a homogeneous **ink** suitable for application to the appropriate anode or cathode side of the membrane; and

(b) a method for applying anode and cathode catalyst to anode and

cathode surfaces for a direct methanol **fuel cell**, comprising forming a mixture of water, perfluorosulfonic acid **ionomer**, alcohols, and catalyst of **platinum-ruthenium** for the anode or **platinum** catalyst for the cathode while cooling and agitating the solution, placing the mixture in a cooler, continuously agitating the mixture, spraying the mixture on the anode or cathode surfaces as determined by the catalyst content.

USE - For making anode and cathode catalysts for application to **ionomeric** membranes for direct methanol fuels.  
Dwg.0/5

L55 ANSWER 15 OF 20 WPIDS (C) 2003 THOMSON DERWENT  
AN 2000-563400 [52] WPIDS  
DNN N2001-155876 DNC C2001-065378  
TI Fabrication of membrane and electrode assembly by coating an electrocatalyst **ink** of carbon-supported **platinum**, glycerol and water on a pre-formed copolymer sheet, and embedding the electrocatalyst coats by hot **pressing**.  
DC A85 L03 X16  
IN CHUN, Y G; KIM, C S; PECK, D H; SHIN, D R; BAEK, D H; JEON, Y G; SHIN, D Y; CHUN, Y; KIM, C; PECK, D  
PA (KOEN-N) KOREA INST ENERGY RES  
CYC 2  
PI KR 99070596 A 19990915 (200052)\*  
US 6180276 B1 20010130 (200123)B 8p  
KR 263992 B1 20000816 (200134)  
ADT KR 99070596 A KR 1998-5531 19980223; US 6180276 B1 US 1998-149088 19980908; KR 263992 B1 KR 1998-5531 19980223  
PRAI KR 1998-5531 19980223  
AB US 6180276 B UPAB: 20010425 ABEQ treated as Basic  
NOVELTY - A membrane and electrode assembly is fabricated by coating an electrocatalyst **ink** on a pre-formed perfluorosulfonyl fluoride copolymer sheet, embedding electrocatalyst coats into the sheet by hot **pressing** the electrocatalyst-coated sheet, and hydrolyzing the electrocatalyst-embedded sheet. The catalyst **ink** comprises carbon-supported **platinum**, glycerol, and water.

DETAILED DESCRIPTION - Fabrication of membrane and electrode assembly (MEA) involves pre-forming a perfluorosulfonyl fluoride copolymer powder into a sheet by hot **pressing** process at 200-250 deg. C, coating an electrocatalyst **ink** on either side of pre-formed sheet by **screen printing** process and drying the coats, embedding the electrocatalyst coats into the sheet by hot **pressing** the electrocatalyst-coated sheet, and hydrolyzing the electrocatalyst-embedded sheet to convert the membrane of the sheet from a non-ionized form into an ionized form. The **ink** comprises carbon-supported **platinum** (Pt/C), glycerol, and water in the absence of perfluorinated sulfonyl fluoride binder. The copolymer powder has 20-200  $\mu$ m particle size distribution.

USE - The method is used for fabricating membrane and electrode assembly for polymer electrolyte membrane **fuel cells** (PEMFC). The PEMFC is used as an electric power source for, e.g. automobiles, as transportable electric source or an on-site power source.

ADVANTAGE - The inventive method is simpler and economically much more favorable than the conventional methods which use **Nafion** solution. The MEA fabricated by the method is far superior to conventional MEAs in the bonding strength between electrode and membrane and in the effective electrode reaction on the three-phase boundary.  
Dwg.0/7

AB KR 99070596 A UPAB: 20010502  
NOVELTY - A membrane and electrode assembly is fabricated by coating an electrocatalyst **ink** on a pre-formed perfluorosulfonyl fluoride copolymer sheet, embedding electrocatalyst coats into the sheet by hot **pressing** the electrocatalyst-coated sheet, and hydrolyzing the

electrocatalyst-embedded sheet. The catalyst **ink** comprises carbon-supported **platinum**, glycerol, and water.

DETAILED DESCRIPTION - Fabrication of membrane and electrode assembly (MEA) involves pre-forming a perfluorosulfonyl fluoride copolymer powder into a sheet by hot **pressing** process at 200-250 deg. C, coating an electrocatalyst **ink** on either side of pre-formed sheet by **screen printing** process and drying the coats, embedding the electrocatalyst coats into the sheet by hot **pressing** the electrocatalyst-coated sheet, and hydrolyzing the electrocatalyst-embedded sheet to convert the membrane of the sheet from a non-ionized form into an ionized form. The **ink** comprises carbon-supported **platinum** (Pt/C), glycerol, and water in the absence of perfluorinated sulfonyl fluoride binder. The copolymer powder has 20-200  $\mu$ m particle size distribution.

USE - The method is used for fabricating membrane and electrode assembly for polymer electrolyte membrane **fuel cells** (PEMFC). The PEMFC is used as an electric power source for, e.g. automobiles, as transportable electric source or an on-site power source.

ADVANTAGE - The inventive method is simpler and economically much more favorable than the conventional methods which use **Nafion** solution. The MEA fabricated by the method is far superior to conventional MEAs in the bonding strength between electrode and membrane and in the effective electrode reaction on the three-phase boundary.  
Dwg.0/7

L55 ANSWER 16 OF 20 CAPLUS COPYRIGHT 2003 ACS

AN 1998:805108 CAPLUS

DN 130:116423

TI Current efficiency for soybean oil hydrogenation in a solid polymer electrolyte reactor

AU An, W.; Hong, J.-K.; Pintauro, P. N.

CS Department of Chemical Engineering, Tulane University, New Orleans, LA, 70118, USA

SO Journal of Applied Electrochemistry (1998), 28(9), 947-954

CODEN: JAELEBJ; ISSN: 0021-891X

PB Chapman & Hall

DT Journal

LA English

AB Soybean oil was hydrogenated electrocatalytically in a solid polymer electrolyte (SPE) reactor, similar to that in H<sub>2</sub>/O<sub>2</sub> **fuel cells**, with water as the anode feed and source of hydrogen. The key component of the reactor was a membrane electrode assembly (MEA), composed of a precious metal-black cathode, a RuO<sub>2</sub> powder anode, and a **Nafion** 117 cation-exchange membrane. The SPE reactor was operated in a batch recycle mode at 60.degree. and one atm. **pressure** using a com.-grade soybean oil as the cathode feed. Various factors that might affect the oil hydrogenation current efficiency were studied, including the type of cathode catalyst, catalyst loading, the cathode catalyst binder loading, c.d., and reactant flow rate. The current efficiency ordering of different cathode catalysts is Pd > Pt > Rh > Ru > Ir. Oil hydrogenation current efficiencies with a Pd-black cathode decreased with increasing c.d. and ranged from .apprx.70% at 0.050 A cm<sup>-2</sup> to 25% at 0.490 A cm<sup>-2</sup>. Current pulsing for frequencies at 0.25-60 Hz had no effect on current efficiencies. The optimum cathode catalyst loading for both Pd and Pt was 2.0 mg cm<sup>-2</sup>. Soybean oil hydrogenation current efficiencies was unaffected by **Nafion** and PTFE cathode catalyst binders, as long as the total binder content was .ltoreq.30% (based on the dry catalyst wt.). When the oil feed flow rate was increased from 80 to 300 mL min<sup>-1</sup>, the oil hydrogenation current efficiency at 0.100 A cm<sup>-2</sup> increased from 60% to 70%. A high (70%) current efficiency was achieved at 80 mL min<sup>-1</sup> by inserting a nickel **screen** turbulence promoter into the oil stream.

RE.CNT 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD

ALL CITATIONS AVAILABLE IN THE RE FORMAT

L55 ANSWER 17 OF 20 WPIDS (C) 2003 THOMSON DERWENT

AN 1996-022133 [03] WPIDS

DNN N1996-018387 DNC C1996-007681

TI Catalytic gas diffusion electrode for a **fuel cell** with solid electrolyte - has hydrophobic porous back support, intermediate layer of electron and proton conductor materials, and a catalytic active layer contg. catalyst and proton conductor.

DC A85 L03 X16

IN DIRVEN, P; ENGELEN, W

PA (VITO-N) VITO VLAAMSE INSTELLING TECHNOLOGISCH

CYC 19

PI EP 687023 A1 19951213 (199603)\* EN 8p

R: AT CH DE DK ES FR GB GR IE IT LI LU NL PT SE

WO 9534098 A1 19951214 (199604) EN 21p

W: JP

CA 2151104 A 19951208 (199614)

BE 1008455 A3 19960507 (199625) NL 22p

US 5561000 A 19961001 (199645) 6p

JP 09501541 W 19970210 (199716) 17p

EP 687023 B1 19980304 (199813) EN 9p

R: AT CH DE DK ES FR GB GR IE IT LI LU NL PT SE

DE 69501681 E 19980409 (199820)

ADT EP 687023 A1 EP 1995-201463 19950602; WO 9534098 A1 WO 1995-BE53 19950607;

CA 2151104 A CA 1995-2151104 19950606; BE 1008455 A3 BE 1994-561 19940607;

US 5561000 A US 1995-465110 19950605; JP 09501541 W WO 1995-BE53 19950607;

JP 1996-500096 19950607; EP 687023 B1 EP 1995-201463 19950602; DE 69501681

E DE 1995-601681 19950602, EP 1995-201463 19950602

FDT JP 09501541 W Based on WO 9534098; DE 69501681 E Based on EP 687023

PRAI BE 1994-561 19940607

AB EP 687023 A UPAB: 19960122

Catalytic gas diffusion electrode for a solid electrolyte cell, esp. a **fuel cell**, has a hydrophobic porous back support, a non-catalytic intermediate layer contg. a mixt. of electron-conductive material (I) and proton-conductive **ionomer** (II), and a catalytic active layer in which the catalyst particles are bound by (II).

Prodn. of the electrode involves: depositing the intermediate layer in the form of an **ink** contg. (I) and (II); and forming the active layer in the form of an **ink** contg. catalyst and (II).

Catalyst is platinised C. Intermediate layer is formed of C powder as (I) and **NAFION** (RTM) as (II). Back layer is a C cloth filled with C powder and binder, pref. PTFE.

Back layer is pref. formed by pasting the C cloth with a blade. The intermediate and catalytic layers are formed by applying the **ink** in multiple stages with intermediate drying steps.

In an example, the back support is formed of a C cloth filled with a paste of 66% C and 34% PTFE emulsion. The **ink** for the intermediate layer contains 10g C, 1l 5% **NAFION** and 1l ethanol. The **ink** for the active layer contains 50g platinised C, 1l 5% **NAFION** and 1l ethanol. The dried intermediate layer has a thickness of a few micron and the **Pt** loading of the outer active layer is 0.43 mg/sq.cm..

USE - Esp. as the O2 electrode of a **fuel cell**.

ADVANTAGE - Electrode promotes highly efficient use of the catalyst and can work with a large output under air at atmos. **pressure**.  
Dwg.0/2

L55 ANSWER 18 OF 20 WPIDS (C) 2003 THOMSON DERWENT

AN 1993-175426 [21] WPIDS

CR 1992-316385 [38]

DNN N1993-134487 DNC C1993-078368

TI Solid polymer electrolyte membrane mfr. for **fuel cell**

*Vref*

- by forming film as **ink** that is spread and cured on film  
release blank the transferring film to membrane and hot **pressing**

DC A85 L03 X16  
IN WILSON, M S  
PA (REGC) UNIV CALIFORNIA  
CYC 1

PI ~~US 5211984~~ A 19930518 (199321)\* 11p ✓

ADT US 5211984 A CIP of US 1991-656329 19910219, CIP of US 1991-736876  
19910729, US 1991-811220 19911220

PRAI US 1991-656329 19910219; US 1991-736876 19910729; US 1991-811220  
19911220

AB US 5211984 A UPAB: 19931116

The mfr. of a SPE membrane assembly comprises (a) furnishing a SPE membrane in Na(+) form; (b) furnishing a perfluorosulphonate **ionomer** in a Na(+) form or thermoplastic form; (c) uniformly dispersing a supported **Pt** catalyst and a solvent in the Na(+) or thermoplastic form of the **ionomer** for form an **ink**; (d) forming a film of the **ink** contg. a predetermined amt. of the catalyst on a surface of the SPE membrane in the Na(+) form; (e) heating the film of the **ink** to a temp. effective to dry the **ink**; and (f) converting the film of the **ink** and the SPE membrane to a protonated form of perfluorosulphonate.

USE/ADVANTAGE - Mfr. of an solid polymer electrolyte (SPE) membrane is provided. It is useful for gas **fuel cells**. The catalyst layer has adequate gas permeability so that the cell performance is not affected and has a density and particle distribution effective to optimise proton access to the catalyst and electronic continuity for electron flow from the half-cell reaction occurring at the catalyst. SPE **fuel cells** are provided with relatively low supported catalyst loadings with no redn. in their performance. The bonding between the SPE layer and the catalyst layer is improved. The wt. fraction of the SPE **ionomer** with the catalyst layer is increased to improve the efficiency of the catalyst layer.

Dwg.1/7

L55 ANSWER 19 OF 20 WPIDS (C) 2003 THOMSON DERWENT

AN 2000-025283 [03] WPIDS

DNN N2000-018945 DNC C2000-006486

TI Production of slurry for proton exchange membrane **fuel cell** catalyst layer.

DC A85 L03 X16

IN CHANG, H; LIM, C

PA (SMSU) SAMSUNG ELECTRONICS CO LTD

CYC 27

PI EP 955687 A2 19991110 (200003)\* EN 12p

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
RO SE SI

KR 99087023 A 19991215 (200056)

US 6344428 B1 20020205 (200211)

ADT EP 955687 A2 EP 1999-300520 19990125; KR 99087023 A KR 1998-60009  
19981229; US 6344428 B1 US 1999-258802 19990226

PRAI KR 1998-60009 19981229; KR 1998-15991 19980504

AB EP 955687 A UPAB: 20000118

NOVELTY - A slurry for the catalyst layer of a proton exchange membrane **fuel cell** is made by forming an alkali metal salt of a perfluorosulfonate **ionomer** solution, adding a polar organic solvent, heating to remove alcohol and adding **platinum**/carbon.

DETAILED DESCRIPTION - A method of making a slurry for forming a catalyst layer of a proton exchange membrane (PEM) **fuel cell** comprises adding an MOH solution (M = Li, Na or K) to a perfluorosulfonate **ionomer** (PFSI) solution to give an M+-PFSI solution, adding an organic polar solvent of higher boiling point than any

alcohol remaining in the PFSI solution and heating to between the alcohol boiling point and 20 deg. C above this to remove remaining alcohol. The pretreated PFSI solution is then mixed with Pt/C to form the slurry. An INDEPENDENT CLAIM is also included for a method as above of making a PEM fuel cell further comprising coating the slurry on one side of an electrode backing layer, drying at not more than the boiling point of the polar solvent, impregnating in acid solution, washing and drying to form a gas diffusion electrode with the deposited catalyst layer and interposing a PEM between anode and cathode side of the electrode and hot pressing.

USE - In forming a catalyst layer for a PEM fuel cell electrode (claimed).

ADVANTAGE - The electrode has improved processing stability and power output characteristics. Continuous production by tape casting is possible and only one coating step is needed.

DESCRIPTION OF DRAWING(S) - A block diagram of the process steps is shown.  
Dwg.2/6

L55 ANSWER 20 OF 20 WPIDS (C) 2003 THOMSON DERWENT

AN 2003-054401 [05] WPIDS

DNC C2003-014000

TI Self-humidifying polymer membrane for polymer fuel cell and process for producing self-humidifying polymer membrane/electrode laminate by using the same.

DC A85 L03 X16

IN BAEK, D H; KIM, C S; KWAK, S H; PARK, G G; YANG, T H; YOON, G H

PA (KOEN-N) KOREA INST ENERGY RES

CYC 1

PI KR 2002030963 A 20020426 (200305)\* 1p

KR 343117 B 20020705 (200305)

ADT KR 2002030963 A KR 2000-61496 20001019; KR 343117 B KR 2000-61496 20001019

FDT KR 343117 B Previous Publ. KR 2002030963

PRAI KR 2000-61496 20001019

AB KR2002030963 A UPAB: 20030121

NOVELTY - Provided are a self-humidifying polymer membrane for a polymer fuel cell, which is produced by using a sputtering method, and a process for producing a self-humidifying polymer membrane/electrode laminate by using the self-humidifying polymer membrane.

DETAILED DESCRIPTION - The self-humidifying polymer membrane is produced by a process comprising the steps of: forming a pre-foamed precursor sheet by hot pressing or rolling a perfluorosulfonyl fluoride/TFE copolymer resin; laminating platinum particles on one side of the pre-foamed precursor sheet by sputtering; laminating closely other pre-foamed precursor sheet on the platinum laminated side; making a pre-foamed precursor sheet laminate by hot pressing or rolling the laminated two pre-foamed precursor sheets; impregnating the pre-foamed precursor sheet laminate in a caustic soda solution to produce Na<sup>+</sup> type perfluoro sulfonate polymer membrane. And the process for producing the self-humidifying polymer membrane/electrode laminate comprises the steps of: making the electrode by coating a film with a catalyst ink comprising platinum coated carbon, a nafion solution, glycerol, and tetrabutyl ammonium hydroxide; laminating the electrode on the Na<sup>+</sup> type polymer membrane and hot pressing; soaking the self-humidifying polymer membrane/electrode laminate in a sulfuric acid solution to produce H<sup>+</sup> type polymer membrane/electrode laminate; cleansing the H<sup>+</sup> type polymer membrane/electrode laminate with deionized pure water many times.  
Dwg.1/10



*Wilson M.S.*

L68 ANSWER 1 OF 7 WPIDS (C) 2003 THOMSON DERWENT  
AN 2000-256445 [22] WPIDS  
DNN N2000-190703 DNC C2000-078188  
TI **Fuel cell** system includes a **fuel cell** stack comprising **fuel cells** having membrane-electrode assemblies that are hydrated with liquid water, and bipolar plates for distributing hydrogen fuel gas and water.  
DC L03 X16  
IN **WILSON, M S**  
PA (REGC) UNIV CALIFORNIA  
CYC 85  
PI WO 2000011745 A1 20000302 (200022)\* EN 28p H01M008-04  
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ UG ZW  
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE GH GM HR HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZA ZW  
AU 9957717 A 20000314 (200031)  
US 6117577 A 20000912 (200046)  
EP 1110264 A1 20010627 (200137) EN H01M008-04  
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI  
EP 1110264 B1 20030402 (200325) EN H01M008-04  
R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE  
ADT WO 2000011745 A1 WO 1999-US17573 19990803; AU 9957717 A AU 1999-57717 19990803; US 6117577 A US 1998-135965 19980818; EP 1110264 A1 EP 1999-945013 19990803, WO 1999-US17573 19990803; EP 1110264 B1 EP 1999-945013 19990803, WO 1999-US17573 19990803  
FDT AU 9957717 A Based on WO 200011745; EP 1110264 A1 Based on WO 200011745; EP 1110264 B1 Based on WO 200011745  
PRAI US 1998-135965 19980818  
IC ICM H01M008-04  
ICS H01M008-02  
AB WO 200011745 A UPAB: 20000508  
NOVELTY - Ambient **pressure fuel cell** system includes a fuel stack comprising **fuel cells** having membrane/electrode assemblies (MEA's) (24) that are hydrated with liquid water, and bipolar plates (26) with anode and cathode channels for respectively distributing hydrogen fuel gas and water to the anode side and air with reactant oxygen to a cathode side.  
DETAILED DESCRIPTION - Ambient **pressure fuel cell** system includes a fuel stack comprising of **fuel cells** having membrane/electrode assemblies (MEA's) that are hydrated with liquid water, and bipolar plates with anode and cathode channels for respectively distributing hydrogen fuel gas and water to the anode side and air with reactant oxygen to a cathode side. The system also includes a liquid water supply to the **fuel cells** for hydrating the MEA's, a hydrogen fuel gas supply, and near-ambient **pressure** blower for blowing air in excess of reaction stoichiometric amounts through the **fuel cell** stack to provide oxygen for electrochemical reaction at the cathode side.  
An INDEPENDENT CLAIM is also included for a method of operating a **fuel cell** stack at ambient **pressure**.  
USE - The system of this invention is useful as hydrogen-oxygen **fuel cells**, and more particularly, to polymer electrolyte membrane **fuel cells**.  
ADVANTAGE - The system of this invention has fully hydrated membranes that overcomes the problems inherent in **pressurized fuel cells** using humidified reactant gases. The system of this invention uses direct liquid hydration at ambient **pressure** to

produce a simple, low-parasitic power system and to provide direct evaporative-cooling from high volume ambient **pressure** air flow.

DESCRIPTION OF DRAWING(S) - Figure showing a cross-section of a unit cell defecting an ambient **fuel cell** system of this invention.

Flow field 12

Membrane/electrode assemblies 24

Bipolar plates 26

Dwg. 1/7

FS CPI EPI

FA AB; GI

MC CPI: L03-E04

EPI: X16-C01C; X16-E06A

L68 ANSWER 2 OF 7 CAPLUS COPYRIGHT 2003 ACS

AN 1992:87618 CAPLUS

DN 116:87618

TI Thin-film catalyst layers for polymer electrolyte **fuel cell** electrodes

AU **Wilson, M. S.**; Gottesfeld, S.

CS Electron. Res. Group, Los Alamos Natl. Lab., Los Alamos, NM, 87545, USA

SO Journal of Applied Electrochemistry (1992), 22(1), 1-7

CODEN: JAELEBJ; ISSN: 0021-891X

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38, 72

AB New structures for the Pt/C catalyst layer of polymer electrolyte **fuel cell** electrodes have been developed that substantially increase the utilization efficiency of the catalyst. Fabricating the catalyst layers and gas diffusion backings sep. makes it possible to formulate each structure with the properties that are most suitable for its function. In the case of the catalyst layer, the optimal properties are hydrophilicity, thinness, uniformity, and the proper ratio of ionomer and supported catalyst. The catalyst layers are cast from soln. as thin films that utilize the ionomer itself as a binder. The thin films are hot **pressed** directly onto the ionomer membranes, and the hydrophobic gas diffusion backings are inserted when the cells are assembled. The performances of **fuel cells** based on the thin film catalyst layers are comparable with those of gas diffusion electrode designs that utilize several times as much Pt, thus the specific activities of the Pt catalyst in the new structures are significantly higher.

ST polymer electrolyte **fuel cell** electrode; platinum

carbon catalyst electrode **fuel cell**

IT Carbon black, uses

RL: USES (Uses)

(electrodes, thin-film platinum catalytic, for polymer electrolyte **fuel cell**)

IT Electrolytic polarization

(of platinum-carbon thin film cathodes in **fuel cell** with Nafion 117 membrane)

IT Polyoxyalkylenes, uses

RL: USES (Uses)

(fluorine- and sulfo-contg., ionomers, binder, in fabrication of platinum-carbon thin film cathodes for **fuel cells**)

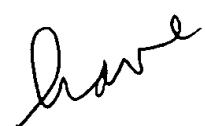
IT Electrodes

(**fuel-cell**, catalytic, platinum- carbon thin film layer for, fabrication and performance of, for polymer electrolyte **fuel cells**)

IT Fluoropolymers

RL: USES (Uses)

(polyoxyalkylene-, sulfo-contg., ionomers, binder, in fabrication of



platinum-carbon thin film cathodes for **fuel cells**)

IT Ionomers  
RL: USES (Uses)  
(polyoxyalkylenes, fluorine- and sulfo-contg., binder, in fabrication of platinum-carbon thin film cathodes for **fuel cells**)

IT 7440-06-4, Platinum, uses  
RL: USES (Uses)  
(catalyst electrodes, thin-film, for polymer electrolyte **fuel cell**)

IT 56-81-5, Glycerol, uses  
RL: USES (Uses)  
(inks contg., in fabrication of thin-film catalyst layers for polymer electrolyte **fuel cell** electrodes)

IT 66796-30-3, Nafion 117  
RL: USES (Uses)  
(membranes, **fuel cell** with thin film platinum-carbon cathodes and, polarization of)

RN 7440-06-4  
RN 56-81-5  
RN 66796-30-3

L68 ANSWER 3 OF 7 WPIDS (C) 2003 THOMSON DERWENT

AN 1992-316385 [38] WPIDS

CR 1993-175426 [21]

DNN N1992-242081 DNC C1992-140580

TI Gas reaction **fuel cell** having solid polymer electrolyte - has film of platinum catalyst in ionomer between solid polymer electrolyte and cathode.

DC A85 J04 L03 X16

IN **WILSON, M S**

PA (REGC) UNIV CALIFORNIA LOS ALAMOS NAT LAB; (LOSA-N) LOS ALAMOS NAT LAN; (REGC) UNIV CALIFORNIA; (USAT) US DEPT ENERGY; (LALA-N) LOS ALAMOS NAT LAB

CYC 17

PI WO 9215121 A1 19920903 (199238)\* EN 29p H01M008-10  
RW: AT BE CH DE DK ES FR GB GR IT LU MC NL SE  
W: CA JP

US 656329 A0 19930501 (199322) 21p H01M000-00  
US 5234777 A 19930810 (199333) 11p H01M008-10  
JP 05507583 W 19931028 (199348) 8p H01M004-92  
EP 600888 A1 19940615 (199423) EN H01M008-10  
R: DE FR GB

EP 600888 B1 19970827 (199739) EN 14p H01M008-10  
R: DE FR GB

DE 69221881 E 19971002 (199745) H01M008-10

ADT WO 9215121 A1 WO 1992-US1058 19920218; US 656329 A0 US 1991-656329 19910219; US 5234777 A CIP of US 1991-656329 19910219, US 1991-736876 19910729; JP 05507583 W JP 1992-507039 19920218, WO 1992-US1058 19920218; EP 600888 A1 EP 1992-907218 19920218, WO 1992-US1058 19920218; EP 600888 B1 EP 1992-907218 19920218, WO 1992-US1058 19920218; DE 69221881 E DE 1992-621881 19920218, EP 1992-907218 19920218, WO 1992-US1058 19920218

FDT JP 05507583 W Based on WO 9215121; EP 600888 A1 Based on WO 9215121; EP 600888 B1 Based on WO 9215121; DE 69221881 E Based on EP 600888, Based on WO 9215121

PRAI US 1991-736876 19910729; US 1991-656329 19910219

REP 2.Jnl.Ref; US 4215183; US 4262063; US 4369103; US 4804592; US 4876115; 7.Jnl.Ref; US 3134697

IC ICM H01M000-00; H01M004-92; H01M008-10  
ICS H01M008-02

AB WO 9215121 A UPAB: 20011211  
A gas reaction **fuel cell** (10) has a solid polymer electrolyte (26) sepg. anode (16) and cathode (18) electrodes. A composite film (22) of a supported Pt catalyst (24) uniformly dispersed in a proton

*have*

conducting ionomer (28) is disposed between the solid polymer electrolyte (26) and the cathode (18). The platinum loading in the composite film (22) is less than 0.35 mg platinum per sq. cm. The composite film (22) is less than 10 microns thick.

USE/ADVANTAGE - The cell (10) is a H2 O2 **fuel cell** needing a catalyst (24) to proceed at useful rates. The composite film (22) optimises proton access to the catalyst (24) while giving adequate gas permeability and electronic continuity for electron flow from the half-cell reaction occurring at the catalyst.

Dwg.1/7

FS CPI EPI  
FA AB; GI  
MC EPI: X16-C01; X16-F02

L68 ANSWER 4 OF 7 WPIDS (C) 2003 THOMSON DERWENT

AN 1997-340925 [31] WPIDS

DNN N1997-282930 DNC C1997-109456

TI Polymer electrolyte membrane **fuel cell** - has macroporous flow-field with interdigitated inlet and outlet reactant channels contacting gas diffusion layer.

DC A85 L03 X16

IN **WILSON, M S**

PA (REGC) UNIV CALIFORNIA OFFICE TECHNOLOGY

CYC 1

PI US 5641586 A 19970624 (199731)\* 12p H01M008-10

ADT US 5641586 A US 1995-568088 19951206

PRAI US 1995-568088 19951206

IC ICM H01M008-10

AB US 5641586 A UPAB: 19970731

A polymer electrolyte membrane **fuel cell** has: (a) a gas diffusion layer (26) with a first side contacting a catalytic surface (28) of the membrane (32); (b) a macro-porous flow-field layer (24) contacting the second side of the gas diffusion layer, for distributing a gaseous reactant over the layer for transport to the membrane; and (c) a reactant distribution plate, having interdigitated flow channels (22) contacting the flow-field layer, for delivering reactant to and removing reactant from the flow-field layer. Also claimed is a polymer electrolyte membrane **fuel cell** as above where the flow field layer defines the interdigitated flow channels. Further claimed is the field flow layer.

ADVANTAGE - the flow field has reduced **pressure** drop through the field. Accumulation of water in the flow field is minimised and access to the catalyst layers is maximised. Backings are very thin, to minimise the gas diffusional barrier.

Dwg.1B/7

FS CPI EPI  
FA AB; GI  
MC CPI: A12-E06; L03-E04  
EPI: X16-C01

L68 ANSWER 5 OF 7 COMPENDEX COPYRIGHT 2003 EEI

AN 1992(10):123814 COMPENDEX DN 9210126227

TI Thin-film catalyst layers for polymer electrolyte **fuel cell** electrodes.

AU **Wilson, M.S.** (Los Alamos Natl Lab, Los Alamos, NM, USA); Gottesfeld, S.

SO J Appl Electrochem v 22 n 1 Jan 1992 p 1-7

CODEN: JAELEBJ ISSN: 0021-891X

PY 1992

DT Journal

TC Experimental

LA English

*have*

AB New structures for the Pt/C catalyst layer of polymer electrolyte **fuel cell** electrodes have been developed that substantially increase the utilization efficiency of the catalyst. Fabricating the catalyst layers and gas diffusion backings separately makes it possible to formulate each structure with the properties that are most suitable for its function. In the case of the catalyst layer, the optimal properties are hydrophilicity, thinness, uniformity, and the proper ratio of ionomer itself as a binder. The thin films are hot **pressed** directly onto the ionomer membranes, and the hydrophobic gas diffusion backings are inserted when the cells are assembled. The performances of **fuel cells** based on the thin film catalyst layers are comparable with those of gas diffusion electrode designs that utilize several times as much platinum, thus the specific activities of the Pt catalysts in the new structures are significantly higher. (Author abstract) 13 Refs.

CC 702 Electric Batteries & Fuel Cells; 802 Chemical Apparatus & Plants; 803 Chemical Agents & Basic Industrial Chemicals; 804 Chemical Products

CT **\*FUEL CELLS**: Electrodes; CATALYSTS: Platinum; ELECTRODES, ELECTROCHEMICAL: Catalysis; IONOMERS; PLATINUM AND ALLOYS: Thin Films; ELECTROLYTES, SOLID

ST POLYMER ELECTROLYTE **FUEL CELLS**; THIN FILM CATALYSTS

ET Pt

L68 ANSWER 6 OF 7 WPIDS (C) 2003 THOMSON DERWENT

AN 1993-175426 [21] WPIDS

CR 1992-316385 [38]

DNN N1993-134487 DNC C1993-078368

TI Solid polymer electrolyte membrane mfr. for **fuel cell**  
- by forming film as ink that is spread and cured on film release blank the transferring film to membrane and hot **pressing**.

DC A85 L03 X16

IN **WILSON, M S**

PA (REGC) UNIV CALIFORNIA

CYC 1

PI US 5211984 A 19930518 (199321)\* 11p H01M004-88

ADT US 5211984 A CIP of US 1991-656329 19910219, CIP of US 1991-736876 19910729, US 1991-811220 19911220

PRAI US 1991-656329 19910219; US 1991-736876 19910729; US 1991-811220 19911220

IC ICM H01M004-88

AB US 5211984 A UPAB: 19931116

The mfr. of a SPE membrane assembly comprises (a) furnishing a SPE membrane in Na(+) form; (b) furnishing a perfluorosulphonate ionomer in a Na(+) form or thermoplastic form; (c) uniformly dispersing a supported Pt catalyst and a solvent in the Na(+) or thermoplastic form of the ionomer for form an ink; (d) forming a film of the ink contg. a predetermined amt. of the catalyst on a surface of the SPE membrane in the Na(+) form; (e) heating the film of the ink to a temp. effective to dry the ink; and (f) converting the film of the ink and the SPE membrane to a protonated form of perfluorosulphonate.

USE/ADVANTAGE - Mfr. of an solid polymer electrolyte (SPE) membrane is provided. It is useful for gas **fuel cells**. The catalyst layer has adequate gas permeability so that the cell performance is not affected and has a density and particle distribution effective to optimise proton access to the catalyst and electronic continuity for electron flow from the half-cell reaction occurring at the catalyst. SPE **fuel cells** are provided with relatively low supported catalyst loadings with no redn. in their performance. The bonding between the SPE layer and the catalyst layer is improved. The wt. fraction of the SPE ionomer with the catalyst layer is increased to improve the efficiency of the catalyst layer.

Dwg. 1/7

FS CPI EPI

FA AB; GI  
MC CPI: A04-A; A04-E10D; A12-E06; A12-M02; L03-E04  
EPI: X16-C01; X16-F02

L68 ANSWER 7 OF 7 WPIDS (C) 2003 THOMSON DERWENT  
AN 2001-528505 [58] WPIDS  
DNN N2001-392173  
TI Bipolar plate for electrochemical cell e.g. **fuel cells**  
, uses electrically conductive foils on both sides of plate which make  
contact mutually at the openings at intersections of channels on both  
sides of support plate.

DC X16  
IN WILSON, M S; ZAWODZINSKI, C  
PA (REGC) UNIV CALIFORNIA  
CYC 1  
PI US 6255012 B1 20010703 (200158)\* 8p H01M002-14  
ADT US 6255012 B1 US 1999-444216 19991119  
PRAI US 1999-444216 19991119  
IC ICM H01M002-14  
AB US 6255012 B UPAB: 20011010

NOVELTY - A bipolar plate (50) has multiple flow channels (52,54) formed  
on both sides of support plate (55), so that the channels on one side are  
perpendicular to channels on other side. The channels have a depth  
effective to form openings through the plate at their intersections (56).  
Electrically conductive foils (58,62) are provided on both sides of the  
plate which make electrical contact (64) mutually at the openings.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for  
**fuel cell** assembly.

USE - In **fuel cell** assembly (claimed) to separate  
fuel and oxidizing reaction gases on opposite sides of plate.

ADVANTAGE - Withstands high clamping **pressure** with the use  
of metal foils that are thin enough to be readily stamped. Light in weight  
and inexpensive.

DESCRIPTION OF DRAWING(S) - The figure shows isometric plan view of  
the bipolar plate.  
Bipolar plate 50  
Support plate 55  
Intersection 56  
Electrically conductive foils 58,62  
Electrical contact 64

Dwg. 4/5

FS EPI  
FA AB; GI  
MC EPI: X16-C01C; X16-C15; X16-E06A

=>

*Gottesfeld*

L92 ANSWER 1 OF 7 CAPLUS COPYRIGHT 2003 ACS  
AN 2002:889103 CAPLUS  
DN 137:372577  
TI Methods and apparatus for a **pressure** driven methanol  
fuel cell system  
IN **Gottesfeld, Shimson**  
PA MTI Microfuel Cells, Inc., USA  
SO PCT Int. Appl., 49 pp.  
CODEN: PIXXD2  
DT Patent  
LA English  
IC ICM H01M008-04  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 47

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002093675	A2	20021121	WO 2002-US15086	20020514
	WO 2002093675	A3	20030306		
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	US 2003031907	A1	20030213	US 2001-855982	20010515
PRAI	US 2001-855982	A2	20010515		

X

AB A **fuel cell** system including a housing defining an anode chamber and a cathode chamber and including a catalyst, a protonically conductive, but electronically nonconductive membrane positioned between the anode chamber and the cathode chamber and a first vent, a fuel chamber in gaseous communication with the anode chamber via a first valve, a liq. chamber in gaseous communication with the anode chamber via a second valve, and a mixing chamber having a second vent. The mixing chamber is in gaseous communication with the anode chamber via a third valve and receives fuel from the fuel chamber through a fuel valve, liq. from the liq. chamber via a liq. valve, and liq. effluent from the anode chamber via a liq. effluent valve. The mixing chamber also provides a fuel mixt. to the anode chamber via a fuel mixt. valve. Using effluent gases, the present invention drives fluids between elements of the **fuel cell** system.

ST methanol **fuel cell** system **pressure** driven

IT Catalysts  
(electrocatalysts; methods and app. for **pressure** driven methanol **fuel cell** system)

IT **Fuel cells**  
Mixing  
(methods and app. for **pressure** driven methanol **fuel cell** system)

IT 67-56-1, Methanol, uses  
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(methods and app. for **pressure** driven methanol **fuel cell** system)

RN 67-56-1

L92 ANSWER 2 OF 7 CAPLUS COPYRIGHT 2003 ACS  
AN 2002:80262 CAPLUS  
DN 136:219496  
TI System issues for Nafion-based portable direct methanol **fuel cells**  
AU Pivovar, Bryan S.; Hickner, Michael; Zawodzinski, Thomas A., Jr.; Ren, Xiaoming; **Gottesfeld, Shimshon**; Neutzler, Jay  
CS Fuel Cells and Electrochemistry, MST-11, Los Alamos National Laboratory, Los Alamos, NM, 87545, USA  
SO Proceedings - Electrochemical Society (2001), 2001-4(Direct Methanol Fuel Cells), 221-230  
CODEN: PESODO; ISSN: 0161-6374  
PB Electrochemical Society  
DT Journal  
LA English  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
AB Direct methanol **fuel cells** are currently being investigated for a no. of different portable power applications, and to date Nafion has been the primary membrane used in such devices. The operating conditions for such devices (low flow rates, ambient air **pressure** and humidification, and room temp. operation) have not been extensively studied. Therefore, in an effort to better understand the behavior of Nafion-based direct methanol **fuel cells** as portable power devices, **fuel cell** expts. have been run under conditions assocd. with passive devices in conventional single cell hardware. Factors such as device size and fuel efficiency are discussed, along with water management issues for such a cell.  
ST direct methanol **fuel cell** Nafion membrane  
IT **Fuel cells**  
(direct methanol; system issues for Nafion-based portable direct methanol **fuel cells**)  
IT Polyoxyalkylenes, uses  
RL: DEV (Device component use); USES (Uses)  
(fluorine- and sulfo-contg., ionomers; system issues for Nafion-based portable direct methanol **fuel cells**)  
IT Fluoropolymers, uses  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylene-, sulfo-contg., ionomers; system issues for Nafion-based portable direct methanol **fuel cells**)  
IT Ionomers  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylenes, fluorine- and sulfo-contg.; system issues for Nafion-based portable direct methanol **fuel cells**)  
IT **Fuel cell** electrolytes  
(system issues for Nafion-based portable direct methanol **fuel cells**)  
IT 66796-30-3, Nafion 117  
RL: DEV (Device component use); USES (Uses)  
(system issues for Nafion-based portable direct methanol **fuel cells**)  
RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE  
(1) Meyers, J; PhD Thesis, University of California 1998  
(2) Moore, R; The Electrochemical Society Proceedings Series 1998, PV98-27, P388  
(3) Ren, X; J Electrochem Soc 1997, V144, PL267 CAPLUS  
(4) Ren, X; J Power Sources 2000, V86, P111 CAPLUS  
RN 66796-30-3

L92 ANSWER 3 OF 7 CAPLUS COPYRIGHT 2003 ACS  
AN 1997:621751 CAPLUS  
DN 127:265507  
TI Modeling of polymer electrolyte **fuel cell** performance

with reformat feed streams: effects of low levels of CO in hydrogen

AU Springer, T.; Zawodzinski, T.; **Gottesfeld, S.**

CS Los Alamos National Laboratory, Los Alamos, NM, 87545, USA

SO Proceedings - Electrochemical Society (1997), 97-13(Electrode Materials and Processes for Energy Conversion and Storage IV), 15-24  
CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 72

AB A simple kinetic model, based on four chem. and electrochem. surface processes taking place at a polymer electrolyte **fuel cell** (PEFC) Pt anode catalyst exposed to hydrogen contg. low levels of CO, reproduces well the characteristic features of PEFC polarization curves recorded under such conditions. These features include a low c.d. domain of good "CO tolerance", limited essentially by the max. rate of hydrogen dissociative chemisorption on a small fraction of the catalyst surface area free of CO. Significantly higher voltage losses are incurred when attempting to exceed this typical limiting c.d., which is detd. by the partial **pressure** of CO and the cell temp. Significant enhancement in performance is shown to result from increases by one-two orders of magnitude in either the inverse of the equil. const. for CO adsorption or in the marginal rate of CO electro-oxidn. at low anodic overpotentials. Rates of CO electro-oxidn. that would be very hard to measure (e.g., 10 nA/cm<sup>2</sup> Pt) could have a significant effect on the magnitude of hydrogen electrooxidn. current obtainable at low voltage loss.

ST modeling polymer electrolyte **fuel cell** performance;  
reformat feed stream **fuel cell**; carbon monoxide  
effect **fuel cell** performance

IT **Fuel cells**  
Oxidation, electrochemical  
Simulation and Modeling, physicochemical  
(modeling of polymer electrolyte **fuel cell**  
performance with reformat feed streams and effects of low levels of CO  
in hydrogen)

IT Petroleum products  
Petroleum products  
Petroleum reforming  
Petroleum reforming  
(reformates; modeling of polymer electrolyte **fuel cell** performance with reformat feed streams and effects of low levels of CO in hydrogen)

IT 7440-06-4, Platinum, uses  
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
(anode catalyst; modeling of polymer electrolyte **fuel cell** performance with reformat feed streams and effects of low levels of CO in hydrogen)

IT 630-08-0, Carbon monoxide, miscellaneous  
RL: MSC (Miscellaneous)  
(modeling of polymer electrolyte **fuel cell** performance with reformat feed streams and effects of low levels of CO in hydrogen)

IT 1333-74-0, Hydrogen, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(modeling of polymer electrolyte **fuel cell** performance with reformat feed streams and effects of low levels of CO in hydrogen)

RN 7440-06-4

RN 630-08-0

RN 1333-74-0

L92 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2003 ACS  
 AN 2000:218901 CAPLUS  
 DN 132:281483  
 TI Recent advances in direct methanol **fuel cells** at Los Alamos National Laboratory  
 AU Ren, X.; Zelenay, P.; Thomas, S.; Davey, J.; **Gottesfeld, S.**  
 CS Los Alamos National Laboratory, Los Alamos, NM, 87545, USA  
 SO Journal of Power Sources (2000), 86(1-2), 111-116  
 CODEN: JPSODZ; ISSN: 0378-7753  
 PB Elsevier Science S.A.  
 DT Journal; General Review  
 LA English  
 CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 51, 67  
 AB A review with 7 refs. This paper describes recent advances in the science and technol. of direct methanol **fuel cells** (DMFCs) made at Los Alamos National Lab. (LANL). The effort on DMFCs at LANL includes work devoted to portable power applications, funded by the Defense Advanced Research Project Agency (DARPA), and work devoted to potential transport applications, funded by the US DOE. We describe recent results with a new type of DMFC stack hardware that allows to lower the pitch per cell to 2 mm while allowing low air flow and air **pressure** drops. Such stack technol. lends itself to both portable power and potential transport applications. Power densities of 300 W/l and 1 kW/l seem achievable under conditions applicable to portable power and transport applications, resp. DMFC power system anal. based on the performance of this stack, under conditions applying to transport applications (joint effort with U.C. Davis), has shown that, in terms of overall system efficiency and system packaging requirements, a power source for a passenger vehicle based on a DMFC could compete favorably with a hydrogen-fueled **fuel cell** system, as well as with **fuel cell** systems based on fuel processing on board. As part of more fundamental studies performed, we describe optimization of anode catalyst layers in terms of PtRu catalyst nature, loading and catalyst layer compn. and structure. We specifically show that, optimized content of recast ionic conductor added to the catalyst layer is a sensitive function of the nature of the catalyst. Other elements of membrane/electrode assembly (MEA) optimization efforts are also described, highlighting our ability to resolve, to a large degree, a well-documented problem of polymer electrolyte DMFCs, namely "methanol crossover". This was achieved by appropriate cell design, enabling fuel utilization as high as 90% in highly performing DMFCs.  
 ST review direct methanol **fuel cell** LANL  
 IT **Fuel cells**  
 (direct-methanol; recent advances in direct methanol **fuel cells** at Los Alamos National Lab.)  
 IT **Fuel cell electrolytes**  
 (membrane electrolytes; recent advances in direct methanol **fuel cells** at Los Alamos National Lab.)  
 IT Electric vehicles  
**Fuel cell anodes**  
 Ionic conductors  
 (recent advances in direct methanol **fuel cells** at Los Alamos National Lab.)  
 IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (recent advances in direct methanol **fuel cells** at Los Alamos National Lab.)  
 IT 67-56-1, Methanol, uses  
 RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)  
 (recent advances in direct methanol **fuel cells** at Los Alamos National Lab.)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE

- (1) Chu, D; J Electrochem Soc 1994, V141, P1770 CAPLUS
- (2) Gottesfeld, S; Advances in Electrochemistry and Electrochemical Engineering 1997, V5 CAPLUS
- (3) Gottesfeld, S; Energy Storage Systems for Electronics, in press
- (4) Ren, X; J Electrochem Soc 1996, V143, PL12 CAPLUS
- (5) Ren, X; J Electrochem Soc 1997, PL267 CAPLUS
- (6) Ren, X; Proton Conducting Membrane Fuel Cells I 1995, P252 CAPLUS
- (7) Thomas, S; J Electrochem Soc, in press

RN 7440-06-4

RN 7440-18-8

RN 67-56-1

L92 ANSWER 5 OF 7 CAPLUS COPYRIGHT 2003 ACS

AN 1995:845448 CAPLUS

DN 123:261660

TI PEM **fuel cell** stack development based on  
membrane-electrode assemblies of ultra-low platinum loading

AU Zawodzinski, Christine; Wilson, Mahlon S.; **Gottesfeld, Shimshon**

CS Mater. Sci. Technol. Div., Los Alamos Natl. Lab., Los Alamos, NM, 87545,  
USA

SO Proceedings - Electrochemical Society (1995), 95-23(Proton Conducting  
Membrane Fuel Cells I), 57-65

CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

AB Scale-up of single cell technol., based on ultra-low platinum loadings,  
was attempted to develop a polymer electrolyte membrane (PEM) **fuel  
cell** stack for stationary power generation. Initial work on  
scale-up to a manifolded single cell based on a 100 cm<sup>2</sup> active area is  
described, with the intention of combining multiples of such cells to  
create stacks. The cells, which are fed by **pressurized** H and  
air, utilize membranes catalyzed by ultra-low platinum loadings (0.14 mg  
Pt/cm<sup>2</sup>) and metal serpentine channel or screen flow-fields to minimize  
costs, while maintaining desirable power d. Some initial promising  
results from testing of stainless steel screens as flow-fields in such  
cells are given; power of 0.5 W/cm<sup>2</sup> at 0.7 V is achieved under mild flow  
and **pressurization** conditions.

ST polymer electrolyte membrane **fuel cell** stack

IT **Fuel cells**

(development of polymer electrolyte membrane **fuel  
cell** stack based on membrane-electrode assemblies of ultra-low  
platinum loading)

IT 7440-06-4, Platinum, uses

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)

(catalytic electrodes; development of polymer electrolyte membrane  
**fuel cell** stack based on membrane-electrode  
assemblies of ultra-low platinum loading)

RN 7440-06-4

L92 ANSWER 6 OF 7 WPIDS (C) 2003 THOMSON DERWENT

AN 2001-441752 [47] WPIDS

DNN N2001-326769 DNC C2001-133497

TI **Fuel cell** for generating electrical energy, has anode  
distribution plate at anode for distributing methanol on its surface, and  
conductive sheet between plate and membrane surface forming mass transport  
barrier.

DC L03 X16

IN **GOTTESFELD, S**; REN, X

PA (REGC) UNIV CALIFORNIA

CYC 90

PI WO 2001048853 A1 20010705 (200147)\* EN 21p H01M008-04  
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
NL OA PT SD SE SL SZ TR TZ UG ZW  
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES  
FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS  
LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL  
TJ TM TR TT TZ UA UG UZ VN YU ZW

US 6296964 B1 20011002 (200160) H01M008-02

AU 2001024264 A 20010709 (200164) H01M008-04

ADT WO 2001048853 A1 WO 2000-US32600 20001130; US 6296964 B1 US 1999-472387  
19991223; AU 2001024264 A AU 2001-24264 20001130

FDT AU 2001024264 A Based on WO 200148853

PRAI US 1999-472387 19991223

IC ICM H01M008-02; H01M008-04

ICS H01M008-10

AB WO 200148853 A UPAB: 20010822

NOVELTY - **Fuel cell** comprises anode distribution plate at anode for distributing methanol over anodic membrane surface of **fuel cell**, and conductive sheet. The conductive sheet is provided between anode distribution plate and membrane surface forming mass transport barrier having specified ratio of methanol current density ( $J_{lim,b}$ ) to design current ( $J_{cell}$ ), of 1.1-1.3.

DETAILED DESCRIPTION - The **fuel cell** which uses methanol direct comprises methanol feed at anode and oxygen or air feed at cathode. The distribution plate is a corrugated plate having perforations (12). Methanol is distributed uniformly along vertical and lateral directions of anodic membrane surface. The **fuel cell** further comprises cathode distribution plate at cathode for distributing oxygen or air and for removing cathode reaction products vertically and laterally over cathodic membrane surface.

An INDEPENDENT CLAIM is also included for utilization of methanol in direct methanol **fuel cell**.

USE - For generating electrical energy.

ADVANTAGE - The reactants are uniformly distributed over the active surface of associated backing plate with small **pressure** drop across the flow channel device. Fuel efficiency of 90%, using properly chosen anode backing, is achieved in direct methanol **fuel cell**.

DESCRIPTION OF DRAWING(S) - The figures show fabrication of flow field plate.

Perforation 12

1A, 1B/10

FS CPI EPI

FA AB; GI

MC CPI: L03-E04

EPI: X16-C01; X16-C09

L92 ANSWER 7 OF 7 WPIDS (C) 2003 THOMSON DERWENT

AN 2002-682608 [73] WPIDS

DNN N2002-538987 DNC C2002-192473

TI Inks for making anode and cathode catalysts for ionomeric membranes of direct methanol fuels, includes platinum and platinum-ruthenium catalysts, purified water, and perfluorosulfonic acid ionomer.

DC A85 G02 J04 L03 X16

IN DAVEY, J; GOTTESFELD, S; REN, X; THOMAS, S C; ZELENAY, P

PA (REGC) UNIV CALIFORNIA

CYC 94

PI WO 2002045188 A2 20020606 (200273)\* EN 20p H01M000-00

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
NL OA PT SD SE SL SZ TR TZ UG ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK  
DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ

LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD  
SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

AU 2002039439 A 20020611 (200273) H01M000-00

ADT WO 2002045188 A2 WO 2001-US45619 20011031; AU 2002039439 A AU 2002-39439  
20011031

FDT AU 2002039439 A Based on WO 200245188

PRAI US 2000-715211 20001114

IC ICM H01M000-00

AB WO 200245188 A UPAB: 20021113

NOVELTY - Inks comprise a platinum catalyst for a cathode catalyst and a platinum-ruthenium catalyst for an anode catalyst, purified water which is 4-20 times that of the catalyst by weight, and a perfluorosulfonic acid ionomer in an amount effective to provide an ionomer content in dried anode and cathode catalyst coats of 20-80 vol.%.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(a) the production of inks for use in anode and cathode catalysts applied to membranes for direct methanol **fuel cells**, comprising combining platinum or platinum-ruthenium catalysts with purified water to form a first mixture, cooling the first mixture to a temperature that reduces evaporation of water from the first mixture, placing the first mixture in a cooler and agitating the mixture to obtain a first homogeneous suspension, adding an alcoholic solution of perfluorosulfonic acid to the first homogeneous suspension to provide a second mixture, agitating the second mixture in the cooler to obtain a homogeneous ink suitable for application to the appropriate anode or cathode side of the membrane; and

(b) a method for applying anode and cathode catalyst to anode and cathode surfaces for a direct methanol **fuel cell**, comprising forming a mixture of water, perfluorosulfonic acid ionomer, alcohols, and catalyst of platinum-ruthenium for the anode or platinum catalyst for the cathode while cooling and agitating the solution, placing the mixture in a cooler, continuously agitating the mixture, spraying the mixture on the anode or cathode surfaces as determined by the catalyst content.

USE - For making anode and cathode catalysts for application to ionomeric membranes for direct methanol fuels.

Dwg. 0/5

FS CPI EPI

FA AB

MC CPI: A12-E06; G02-A04A; J04-E04; L03-E04  
EPI: X16-C; X16-C09

=>

Wilson

L105 ANSWER 1 OF 4 CAPLUS COPYRIGHT 2003 ACS

AN 2000:145143 CAPLUS

DN 132:154467

TI Ambient **pressure fuel cell** system

IN **Wilson, Mahlon S.**

PA The Regents of the University of California, USA

SO PCT Int. Appl., 28 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM H01M008-04

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000011745	A1	20000302	WO 1999-US17573	19990803
	W:				
	AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW:				
	GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	US 6117577	A	20000912	US 1998-135965	19980818
	CA 2340765	AA	20000302	CA 1999-2340765	19990803
	AU 9957717	A1	20000314	AU 1999-57717	19990803
	EP 1110264	A1	20010627	EP 1999-945013	19990803
	EP 1110264	B1	20030402		
	R:				
	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	AT 236457	E	20030415	AT 1999-945013	19990803
PRAI	US 1998-135965	A	19980818		
	WO 1999-US17573	W	19990803		

AB An ambient **pressure fuel cell** system is provided with a **fuel cell** stack formed from a plurality of **fuel cells** having membrane/electrode assemblies (MEAs) that are hydrated with liq. water and bipolar plates with anode and cathode sides for distributing hydrogen fuel gas and water to a first side of each one of the MEAs and air with reactant oxygen gas to a second side of each one of the MEAs. A pump supplies liq. water to the **fuel cells**. A recirculating system may be used to return unused hydrogen fuel gas to the stack. A near-ambient **pressure** blower blows air through the **fuel cell** stack in excess of reaction stoichiometric amts. to react with the hydrogen fuel gas.

ST **fuel cell** system ambient **pressure**

IT **Fuel cells**

(ambient **pressure fuel cell** system)

IT Epoxy resins, uses

RL: DEV (Device component use); USES (Uses)

(ambient **pressure fuel cell** system)

IT 7782-42-5, Graphite, uses

RL: DEV (Device component use); USES (Uses)

(ambient **pressure fuel cell** system)

IT 7782-44-7, Oxygen, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(ambient **pressure fuel cell** system)

IT 1333-74-0, Hydrogen, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(ambient **pressure fuel cell** system)

RE.CNT 8      THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE

- (1) Cargnelli; US 5753383 A 1998 CAPLUS
- (2) Ernst; US 5912088 1999
- (3) Farooque; US 5084362 A 1992 CAPLUS
- (4) Nakazawa; US 5134043 A 1992 CAPLUS
- (5) Okamoto; US 5837393 A 1998
- (6) Reiser; US 5853909 A 1998 CAPLUS
- (7) Scheffler; US 4859545 A 1989
- (8) Sederquist; US 5330857 A 1994 CAPLUS

RN 7782-42-5

RN 7782-44-7

RN 1333-74-0

L105 ANSWER 2 OF 4 CAPLUS COPYRIGHT 2003 ACS

AN 1995:845448 CAPLUS

DN 123:261660

TI PEM **fuel cell** stack development based on

membrane-electrode assemblies of ultra-low platinum loading

AU Zawodzinski, Christine; **Wilson, Mahlon S.**; Gottesfeld, Shimshon

CS Mater. Sci. Technol. Div., Los Alamos Natl. Lab., Los Alamos, NM, 87545, USA

SO Proceedings - Electrochemical Society (1995), 95-23 (Proton Conducting Membrane Fuel Cells I), 57-65

CODEN: PESODO; ISSN: 0161-6374

PB Electrochemical Society

DT Journal

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

AB Scale-up of single cell technol., based on ultra-low platinum loadings, was attempted to develop a polymer electrolyte membrane (PEM) **fuel cell** stack for stationary power generation. Initial work on scale-up to a manifolded single cell based on a 100 cm<sup>2</sup> active area is described, with the intention of combining multiples of such cells to create stacks. The cells, which are fed by **pressurized** H and air, utilize membranes catalyzed by ultra-low platinum loadings (0.14 mg Pt/cm<sup>2</sup>) and metal serpentine channel or screen flow-fields to minimize costs, while maintaining desirable power d. Some initial promising results from testing of stainless steel screens as flow-fields in such cells are given; power of 0.5 W/cm<sup>2</sup> at 0.7 V is achieved under mild flow and **pressurization** conditions.

ST polymer electrolyte membrane **fuel cell** stack

IT **Fuel cells**

(development of polymer electrolyte membrane **fuel**

**cell** stack based on membrane-electrode assemblies of ultra-low platinum loading)

IT 7440-06-4, Platinum, uses

RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)

(catalytic electrodes; development of polymer electrolyte membrane

**fuel cell** stack based on membrane-electrode

assemblies of ultra-low platinum loading)

RN 7440-06-4

L105 ANSWER 3 OF 4 CAPLUS COPYRIGHT 2003 ACS

AN 1993:84416 CAPLUS

DN 118:84416

TI Membrane catalyst layer for **fuel cells**

IN **Wilson, Mahlon Scott**

PA United States Dept. of Energy, USA

SO PCT Int. Appl., 29 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9215121	A1	19920903	WO 1992-US1058	19920218
	W: CA, JP				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE				
	US 656329	A0	19930501	US 1991-656329	19910219
	US 5234777	A	19930810	US 1991-736876	19910729
	JP 05507583	T2	19931028	JP 1992-507039	19920218
	EP 600888	A1	19940615	EP 1992-907218	19920218
	EP 600888	B1	19970827		

R: DE, FR, GB

PRAI US 1991-656329 19910219  
US 1991-736876 19910729  
WO 1992-US1058 19920218

AB **Fuel cells** incorporate a .ltorsim.10-.mu.m catalyst layer between a solid polymer electrolyte membrane and a porous electrode backing. The catalyst layer has C-supported Pt catalyst loading >0.1 and .ltorsim.0.35 mg Pt/cm2. The layer is formed as an ink that is spread and cured on a film-release blank. The cured film is transferred to the membrane and hot **pressed** into the surface to form a catalyst layer having a controlled thickness and catalyst distribution. Alternately, the catalyst layer is formed by applying a Na+ form of a perfluorosulfonate ionomer directly to the membrane, drying the film at .gtoreq.150.degree., and then converting the film back to the protonated form of the ionomer. The layer has an adequate gas permeability so that the cell performance is not affected and has an effective d. and particle distribution to optimize proton access to the catalyst and electronic continuity for electron flow from the half-cell reaction occurring at the catalyst.

ST ionomer perfluorosulfonate platinum electrode; **fuel cell**  
platinum electrode

IT Ionomers

RL: USES (Uses)

(fluoropolymers, sulfo-contg., protonated, electrodes from platinum-contg., catalytic, for **fuel cells**)

IT Electrodes

(**fuel-cell**, catalytic, platinum in protonated perfluorosulfonate ionomer)

IT Fluoropolymers

RL: USES (Uses)

(ionomers, sulfo-contg., protonated, electrodes from platinum-contg., catalytic, for **fuel cells**)

IT 7440-06-4, Platinum, uses

RL: USES (Uses)

(electrodes, catalytic, in protonated perfluorosulfonate ionomer, for **fuel cells**)

RN 7440-06-4

L105 ANSWER 4 OF 4 CAPLUS COPYRIGHT 2003 ACS

AN 2001:480625 CAPLUS

DN 135:63840

TI Pleated metal bipolar assembly for use in electrochemical cells

IN **Wilson, Mahlon S.**; Zawodzinski, Christine

PA The Regents of the University of California, USA

SO U.S., 8 pp.

CODEN: USXXAM

DT Patent

LA English

IC ICM H01M002-14

NCL 429038000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 72

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6255012	B1	20010703	US 1999-444216	19991119
PRAI	US 1999-444216		19991119		

AB A thin low-cost bipolar plate for an electrochem. cell is formed from a polymer support plate with first flow channels on a first side of the support plate and second flow channels on a second side of the support plate, where the first flow channels and second flow channels have intersecting locations and have a depth effective to form openings through the support plate at the intersecting locations. A first foil of elec. conductive material is **pressed** into the first flow channels. A second foil of elec. conductive material **pressed** into the second flow channels so that elec. contact is made between the first and second foils at the openings through the support plate. A particular application of the bipolar plate is in polymer electrolyte **fuel** cells.

ST **fuel cell** pleated metal bipolar assembly; electrochem  
cell pleated metal bipolar assembly

IT **Fuel cells**

(pleated metal bipolar assembly for use in electrochem. cells)

IT Polymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(support plate; pleated metal bipolar assembly for use in electrochem. cells)

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Malhi; US 5789093 1998 CAPLUS
- (2) Mukohyama; US 5798188 1998 CAPLUS
- (3) Plowman; US 4755272 1988 CAPLUS
- (4) Shinn; US 3880670 1975 CAPLUS
- (5) Tajima; US 5541015 1996 CAPLUS
- (6) Wilson; US 5798187 1998 CAPLUS

=>

429/NCL

L111 ANSWER 1 OF 2 USPATFULL

AN 95:80009 USPATFULL  
TI Method for making reinforced ion exchange membranes  
IN Banerjee, Shoibal, Newark, DE, United States  
PA E. I. Du Pont de Nemours and Company, Wilmington, DE, United States  
(U.S. corporation)  
PI US 5447636 19950905  
AI US 1993-168869 19931214 (8)  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Kim, John  
CLMN Number of Claims: 19  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 684

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A method for making a composite fluorinated ion exchange membrane is provided comprising applying a continuous fluorinated ion exchange polymer film to a porous reinforcing substrate, preferably made from a polyolefin such as linear high density polyethylene. The composite membrane is made by applying a solvent to the surface of the film and/or the substrate and then affixing the reinforcing substrate. These reinforced membranes may advantageously be used as separators in **fuel cells**, and as selective barriers in permeation separation and facilitated transport operations.

L111 ANSWER 2 OF 2 USPATFULL

AN 88:14606 USPATFULL  
TI Reinforced flexible graphite sheet  
IN Fukuda, Hiroyuki, Iwaki, Japan  
Shigeta, Masatomo, Iwaki, Japan  
Kaji, Hisatsugu, Iwaki, Japan  
Saitoh, Kuniyuki, Abiko, Japan  
PA Kureha Kagaku Kogyo Kabushiki Kaisha, Tokyo, Japan (non-U.S.  
corporation)  
PI US 4729910 19880308  
AI US 1985-719562 19850403 (6)  
PRAI JP 1984-71659 19840410  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Lusignan, Michael R.  
LREP Cushman, Darby & Cushman  
CLMN Number of Claims: 7  
ECL Exemplary Claim: 1  
DRWN 1 Drawing Figure(s); 1 Drawing Page(s)  
LN.CNT 219

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed herein is a reinforced flexible graphite sheet uniformly containing a thermosetting resin prepared by impregnating a flexible graphite sheet with a liquid thermosetting resin having the carbonizing yield of more than 20% under a reduced pressure and thereafter, heat-setting the resin, an amount of the resin impregnated being in the range of 0.5 to 20% by weight based on the flexible graphite sheet.

=>

429/NCL

L124 ANSWER 1 OF 13 USPATFULL

AN 2001:208280 USPATFULL

TI Membrane electrode assembly

IN Debe, Mark K., Stillwater, MN, United States

Poirier, Richard J., White Bear Lake, MN, United States

Wackerfuss, Michael K., Roseville, MN, United States

Ziegler, Raymond J., Glenwood City, WI, United States

PA 3M Innovative Properties Company, Saint Paul, MN, United States (U.S. corporation)

PI US 6319293 B1 20011120

AI US 1998-208657 19981210 (9)

RLI Division of Ser. No. US 1997-948599, filed on 10 Oct 1997, now patented, Pat. No. US 5879828

DT Utility

FS GRANTED

EXNAM Primary Examiner: Bell, Bruce F.

LREP Dahl, Philip Y.

CLMN Number of Claims: 7

ECL Exemplary Claim: 1

DRWN 25 Drawing Figure(s); 23 Drawing Page(s)

LN.CNT 1921

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A membrane electrode assembly is provided comprising an ion conducting membrane and one or more electrode layers that comprise nanostructured elements, wherein the nanostructured elements are in incomplete contact with the ion conducting membrane. This invention also provides methods to make the membrane electrode assembly of the invention. The membrane electrode assembly of this invention is suitable for use in electrochemical devices, including proton exchange membrane **fuel cells**, electrolyzers, chlor-alkali separation membranes, and the like.

L124 ANSWER 2 OF 13 USPATFULL

AN 1999:30515 USPATFULL

TI Membrane electrode assembly

IN Debe, Mark K., Stillwater, MN, United States

Poirier, Richard J., White Bear Lake, MN, United States

Wackerfuss, Michael K., Roseville, MN, United States

Ziegler, Raymond J., Glenwood City, WI, United States

PA Minnesota Mining and Manufacturing Company, St. Paul, MN, United States (U.S. corporation)

PI US 5879828 19990309

AI US 1997-948599 19971010 (8)

DT Utility

FS Granted

EXNAM Primary Examiner: Bell, Bruce F.

LREP Dahl, Philip Y.

CLMN Number of Claims: 14

ECL Exemplary Claim: 1

DRWN 25 Drawing Figure(s); 23 Drawing Page(s)

LN.CNT 1974

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A membrane electrode assembly is provided comprising an ion conducting membrane and one or more electrode layers that comprise nanostructured elements, wherein the nanostructured elements are in incomplete contact with the ion conducting membrane. This invention also provides methods to make the membrane electrode assembly of the invention. The membrane electrode assembly of this invention is suitable for use in electrochemical devices, including proton exchange membrane **fuel cells**, electrolyzers, chlor-alkali separation membranes, and the like.

L124 ANSWER 3 OF 13 USPATFULL

AN 2002:3770 USPATFULL  
 TI Membrane electrode assembly, and solid polymer **fuel cell** using the assembly  
 IN Tsusaka, Kyoko, Aichi-ken, JAPAN  
 Kawasumi, Masaya, Aichi-ken, JAPAN  
 Morimoto, Yu, Aichi-ken, JAPAN  
 PA Kabushiki Kaisha Toyota Chuo Kenkyusho, Aichi-gun, JAPAN (non-U.S. corporation)  
 PI US 2002001744 A1 20020103  
 AI US 2001-858979 A1 20010517 (9)  
 PRAI JP 2000-145877 20000518  
 JP 2000-401275 20001228  
 DT Utility  
 FS APPLICATION  
 LREP OBLON SPIVAK MCCLELLAND MAIER & NEUSTADT PC, FOURTH FLOOR, 1755 JEFFERSON DAVIS HIGHWAY, ARLINGTON, VA, 22202  
 CLMN Number of Claims: 18  
 ECL Exemplary Claim: 1  
 DRWN 6 Drawing Page(s)  
 LN.CNT 1844

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed is a membrane electrode assembly obtained by bonding electrodes to both surfaces of a solid polymer electrolyte membrane suitably for use in a solid polymer **fuel cell**. In order to maintain not only the solid polymer electrolyte but also the electrode in appropriate wet states, the catalyst layer of the assembly contains a metalloxane polymer in the intra-catalyst-layer electrolyte including an electrode catalyst preferably in an amount of 0.5 to 50 wt % of the total weight of the intra-catalyst-layer electrolyte and the metalloxane polymer contained therein exclusive of the electrode catalyst. It is also preferred that a metalloxane polymer be included in the solid polymer electrolyte membrane in an amount of 0.5 to 50 wt % of the total weight of the solid polymer electrolyte membrane and the metalloxane polymer contained therein. The membrane electrode assembly constituted as above may be obtained by bonding the catalyst layer containing metalloxane monomer to the solid polymer electrolyte membrane by hot-**pressing** or the like. Here, it is preferred that the gas-phase surface of the intra-catalyst-layer electrolyte be covered with a gas-permeable, water repellent layer. The water-repellent layer may be formed by various methods such as applying hydrophobic metalloxane precursor, followed by polycondensation.

L124 ANSWER 4 OF 13 USPATFULL

AN 2002:32486 USPATFULL  
 TI Composite catalyst for solid polymer electrolyte type **fuel cell** and processes for producing the same  
 IN Hitomi, Shuji, Kyoto, JAPAN  
 Tsumura, Naohiro, Kyoto, JAPAN  
 Mizutani, Shunsuke, Kyoto, JAPAN  
 PI US 2002019308 A1 20020214  
 US 6492295 B2 20021210  
 AI US 2001-808032 A1 20010315 (9)  
 PRAI JP 2000-72347 20000315  
 JP 2000-126636 20000426  
 JP 2000-140483 20000512  
 DT Utility  
 FS APPLICATION  
 LREP SUGHRUE, MION, ZINN, MACPEAK & SEAL, PLLC, 2100 PENNSYLVANIA AVENUE, N.W., WASHINGTON, DC, 20037-3213  
 CLMN Number of Claims: 21  
 ECL Exemplary Claim: 1

DRWN 16 Drawing Page(s)

LN.CNT 981

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A composite catalyst which comprises a catalyst particle and at least one member selected from the group consisting of a porous or net-form cation-exchange resin and a porous or net-form hydrophobic polymer, wherein the resin and polymer exist on the surface of the catalyst particle.

L124 ANSWER 5 OF 13 USPAT2

AN 2002:32486 USPAT2

TI Composite catalyst for solid polymer electrolyte type fuel cell and processes for producing the same

IN Hitomi, Shuji, Kyoto, JAPAN

Tsumura, Naohiro, Kyoto, JAPAN

Mizutani, Shunsuke, Kyoto, JAPAN

PA Japan Storage Battery Co., Ltd., Kyoto, JAPAN (non-U.S. corporation)

PI US 6492295 B2 20021210

AI US 2001-808032 20010315 (9)

PRAI JP 2000-72347 20000315

JP 2000-126636 20000426

JP 2000-140483 20000512

DT Utility

FS GRANTED

EXNAM Primary Examiner: Bell, Mark L.; Assistant Examiner: Hailey, Patricia L.

LREP Sughrue Mion, PLLC

CLMN Number of Claims: 21

ECL Exemplary Claim: 1

DRWN 25 Drawing Figure(s); 16 Drawing Page(s)

LN.CNT 979

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A composite catalyst which comprises a catalyst particle and at least one member selected from the group consisting of a porous or net-form cation-exchange resin and a porous or net-form hydrophobia polymer, wherein the resin and polymer exist on the surface of the catalyst particle.

L124 ANSWER 6 OF 13 USPATFULL

AN 2003:10506 USPATFULL

TI Solid polymer type fuel battery

IN Ito, Hideki, Hiroshima, Hiroshima-ken, JAPAN

Kobayashi, Toshiro, Hiroshima, Hiroshima-ken, JAPAN

Moriga, Takuya, Hiroshima, Hiroshima-ken, JAPAN

Yamada, Akihiko, Yokohama Kanagawa-ken, JAPAN

PI US 2003008200 A1 20030109

AI US 2002-129133 A1 20020516 (10)

WO 2001-JP8103 20010918

PRAI JP 2000-282397 20000918

DT Utility

FS APPLICATION

LREP OBLON SPIVAK MCCLELLAND MAIER & NEUSTADT PC, FOURTH FLOOR, 1755 JEFFERSON DAVIS HIGHWAY, ARLINGTON, VA, 22202

CLMN Number of Claims: 9

ECL Exemplary Claim: 1

DRWN 6 Drawing Page(s)

LN.CNT 509

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A polymer electrolyte fuel cell comprising a cell having a solid polymer film separators disposed on both sides of the cell so as to interpose the cell therebetween, and diffusion layers disposed between the cell and the separators and each having a substrate comprising an electrically conductive porous material and a slurry layer disposed on the substrate, wherein at least a part of each diffusion

layer is provided with a gas barrier for preventing the permeation of gas in a direction parallel to the major surface of the diffusion layer.

L124 ANSWER 7 OF 13 USPATFULL

AN 75:41112 USPATFULL  
TI Gas electrodes and a process for producing them  
IN Kordesch, Karl V., Lakewood, OH, United States  
PA Union Carbide Corporation, New York, NY, United States (U.S. corporation)  
PI US 3899354 19750812  
AI US 1973-395552 19730910 (5)  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Mack, John H.; Assistant Examiner: Feeley, H. A.  
LREP O'Brien, C. F.  
CLMN Number of Claims: 12  
ECL Exemplary Claim: 1  
DRWN No Drawings  
LN.CNT 586

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A thin catalyzed gas electrode for **fuel cells** comprising a porous wet proofed conductive substrate having a first water-repellent porous active conductive layer over which is a surface-deposited noble metal catalyst in an amount of at least about 0.5 mg/cm.<sup>2</sup>, and a process for producing such an electrode.

L124 ANSWER 8 OF 13 USPATFULL

AN 1998:150537 USPATFULL  
TI Process for forming a catalyst layer on an electrode by spray-drying  
IN Tada, Tomoyuki, Kanagawa, Japan  
PA Tanaka Kikinzoku Kogyo K.K., Japan (non-U.S. corporation)  
Watanabe, Masahiro, Japan (non-U.S. individual)  
Stonehart Associates Inc., Madison, CT, United States (U.S. corporation)  
PI US 5843519 19981201  
AI US 1995-543632 19951016 (8)  
PRAI JP 1994-277108 19941017  
JP 1994-332291 19941017  
JP 1994-289288 19941028  
JP 1994-289289 19941028  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Bareford, Katherine A.  
LREP Klauber & Jackson  
CLMN Number of Claims: 2  
ECL Exemplary Claim: 1  
DRWN 11 Drawing Figure(s); 5 Drawing Page(s)  
LN.CNT 896


CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed herein are four aspects of processes for preparing an electrode for a solid polymer electrolyte electrochemical cell such as a **fuel cell**. According to the processes, the electrode having a thin and uniform electrocatalyst layer can be obtained effectively and economically. The processes include a spraying method, a paste rolling method and a dry mixture method.


L124 ANSWER 9 OF 13 USPATFULL

AN 2001:190851 USPATFULL  
TI Membrane-electrode unit for polymer electrolyte **fuel cells** and processes for their preparation  
IN Zuber, Ralf, Grossostheim, Germany, Federal Republic of  
Fehl, Knut, Schluchtern, Germany, Federal Republic of  
Starz, Karl-Anton, Rodenbach, Germany, Federal Republic of  
Stenke, Udo, Mainaschaff, Germany, Federal Republic of

PA Degussa AG, Hanau, Germany, Federal Republic of (non-U.S. corporation)  
PI US 6309772 B1 20011030  
AI US 1999-274018 19990322 (9)  
PRAI DE 1998-19812592 19980323  
DT Utility  
FS GRANTED  
EXNAM Primary Examiner: Nguyen, Nam; Assistant Examiner: VerSteeg, Steven H.  
LREP Smith, Gambrell & Russell, LLP  
CLMN Number of Claims: 29  
ECL Exemplary Claim: 1  
DRWN 5 Drawing Figure(s); 3 Drawing Page(s)  
LN.CNT 578  
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A membrane-electrode unit for polymer-electrolyte **fuel cells**. The membrane-electrode unit consists of a polymer electrolyte membrane and porous reaction layers applied to both sides comprising a catalyst and a proton-conducting polymer, a so-called ionomer. The membrane-electrode unit is characterized in that one part A1 of the catalyst of the reaction layers is saturated with the ionomer and is embedded in the ionomer whereas one part A2 of the catalyst is kept free from the ionomer, where the parts A1 and A2 are in a weight ratio of 1:1 to 20:1. 

L124 ANSWER 10 OF 13 USPATFULL

AN 2000:164209 USPATFULL  
TI Catalyst layer for polymer electrolyte **fuel cells**  
IN Zuber, Ralf, Grossostheim, Germany, Federal Republic of  
Karch, Ralf, Kleinostheim, Germany, Federal Republic of  
Fehl, Knut, Schluchtern-Ramholz, Germany, Federal Republic of  
Starz, Karl-Anton, Rodenbach, Germany, Federal Republic of  
PA Degussa-Huls Aktiengesellschaft, Frankfurt am Main, Germany, Federal Republic of (non-U.S. corporation)  
PI US 6156449 20001205  
AI US 1999-376438 19990818 (9)  
PRAI DE 1998-19837669 19980820  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Bell, Bruce F.  
CLMN Number of Claims: 26  
ECL Exemplary Claim: 1  
DRWN 5 Drawing Figure(s); 2 Drawing Page(s)  
LN.CNT 634  
CAS INDEXING IS AVAILABLE FOR THIS PATENT. 

AB A catalyst layer on a substrate material which contains a proton-conducting polymer (ionomer), electrically conductive carbon particles and fine particles of at least one precious metal. The catalyst layer is obtainable by coating the substrate material with an ink which contains a dispersion of the carbon particles and at least one organic precious metal complex compound in a solution of the ionomer, and drying the coating below a temperature at which the ionomer or the substrate material is thermally damaged, the precious metals in the complex compounds being present with an oxidation number of 0 and the complex compounds being thermally decomposed during drying to form the fine precious metal particles.

L124 ANSWER 11 OF 13 USPATFULL

AN 90:44235 USPATFULL  
TI Gas permeable electrode  
IN Watanabe, Masahiro, No. 2-10, Kitashin 1-chome, Kofu-shi, Yamanashi, Japan  
Motoo, Satoshi, No. 5-24, Takeda 3-chome, Kofu-shi, Yamanashi, Japan  
Furuya, Nagakazu, No. 4-3-31, Ohte 2-chome, Kofu-shi, Yamanashi, Japan  
PA Watanabe, Masahiro, Japan (non-U.S. individual)

Motoo, Satoshi, Japan (non-U.S. individual)  
Furuya, Nagakazu, Japan (non-U.S. individual)  
Tanaka Kikinzoku Kogyo, Japan (non-U.S. corporation)  
PI US 4931168 19900605  
AI US 1989-356612 19890523 (7)  
RLI Continuation of Ser. No. US 1987-22437, filed on 6 Mar 1987, now abandoned  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Niebling, John F.; Assistant Examiner: Gorgos, Kathryn  
LREP Klauber & Jackson  
CLMN Number of Claims: 11  
ECL Exemplary Claim: 2  
DRWN 52 Drawing Figure(s); 11 Drawing Page(s)  
LN.CNT 995

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB Disclosed herein is a gas permeable electrode which comprises a gas permeable layer and a reaction layer, the reaction layer comprising hydrophobic portions and hydrophilic portions. Electrolyte penetrates into the reaction layer and does not penetrate into the gas permeable layer, and only the gas produced on the electrode and the gas supplied penetrate into the gas permeable layer. The gas can be released from the rear side of the electrode and the reaction surface thereof is never covered with the gas. X

L124 ANSWER 12 OF 13 USPATFULL

AN 80:59004 USPATFULL  
TI Method of making improved hydrogenation catalyst  
IN Berchielli, Aldo S., Westerly, RI, United States  
Chireau, Roland F., Quaker Hills, CT, United States  
PA Yardney Electric Corporation, Pawcatuck, CT, United States (U.S. corporation)  
PI US 4235748 19801125  
AI US 1979-16219 19790228 (6)  
DT Utility  
FS Granted  
EXNAM Primary Examiner: Konopka, P. E.  
LREP Nist, Donald E.  
CLMN Number of Claims: 9  
ECL Exemplary Claim: 1,4,6  
DRWN No Drawings  
LN.CNT 406

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB The present invention provides a method of making an improved catalyst useful for hydrogenation of organic compounds and in other reactions. The method comprises mixing a porous particulate refractory support material with a hydrophobic polymeric binder to form an essentially homogeneous mixture and then catalyzing this mixture by introducing into the pores of the mixture a salt of a metal of the eighth group of the Periodic Table in a **non-polar solvent** in which the salt is ionizable. Further in accordance with the method, the salt is reduced to the catalytic metal within the pores of the mixture, specifically within the pores of the support material, by contacting with a selected reducing agent, for example, hydrazine or sodium bis (2-methoxyethoxy) aluminum hydride, preferably in solution. A porous structure is formed from the mixture either before or after the catalysis. Preferably, the structure is sintered as a final step. The support material in the mixture is preferably activated carbon having an average particle diameter of about 0.01-0.3 microns and the structure preferably has pores of an average diameter of about 30-300 A.degree.. Most preferably, the binder is polytetrafluoroethylene. During the mixing step, the mixture is sheared to a fine filament-like fibrous structure of a uniform spongy nature with no grossly detectable free X

carbon or polytetrafluoroethylene particles.

L124 ANSWER 13 OF 13 USPATFULL

AN 76:49202 USPATFULL

TI Method for catalyzing a fuel cell electrode and an electrode so produced

IN Katz, Murray, Newington, CT, United States

Kaufman, Arthur, Bloomfield, CT, United States

PA United Technologies Corporation, East Hartford, CT, United States (U.S. corporation)

PI US 3979227 19760907

AI US 1976-645962 19760102 (5)

RLI Division of Ser. No. US 1974-533918, filed on 18 Dec 1974, now patented, Pat. No. US 3932197

DT Utility

FS Granted

EXNAM Primary Examiner: Mack, John H.; Assistant Examiner: Feeley, H. A.

LREP Stone, Steven F.

CLMN Number of Claims: 4

ECL Exemplary Claim: 1

DRWN 2 Drawing Figure(s); 2 Drawing Page(s)

LN.CNT 586

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

AB A porous conducting particle, hydrophobic bonded, substrate supported electrode is prewetted with the electrolyte. A D.C. voltage is applied to the electrode to assist in the prewetting with the electrolyte. A soluble catalyst-containing material is then introduced into the electrode structure and the catalyst deposited within the electrode. By appropriate selection of the porous conducting particles and the catalyst-applying techniques, precise control of the location of the catalyst can be obtained. If graphite materials are used as the conducting particles, a catalyst-containing salt is allowed to dissolve in the electrolyte in the prewetted electrode, and the catalyst-containing material is reduced to the metal. If the reduction is done by reaction with a reducing gas such as hydrogen, the catalyst will be deposited only in those regions of the electrode at which there is an electrolyte-reactant gas interface which is in electrical-conducting relationship with the substrate. Alternatively, extremely precise amounts of catalyst can be deposited within the electrode structure by use of a solution of a compound of the catalyst whose wettability with the hydrophobic material varies as the solution evaporates. By this technique almost 100% of the catalyst can be deposited within the electrode structure on the hydrophilic region, with virtually no losses in the hydrophobic material.

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